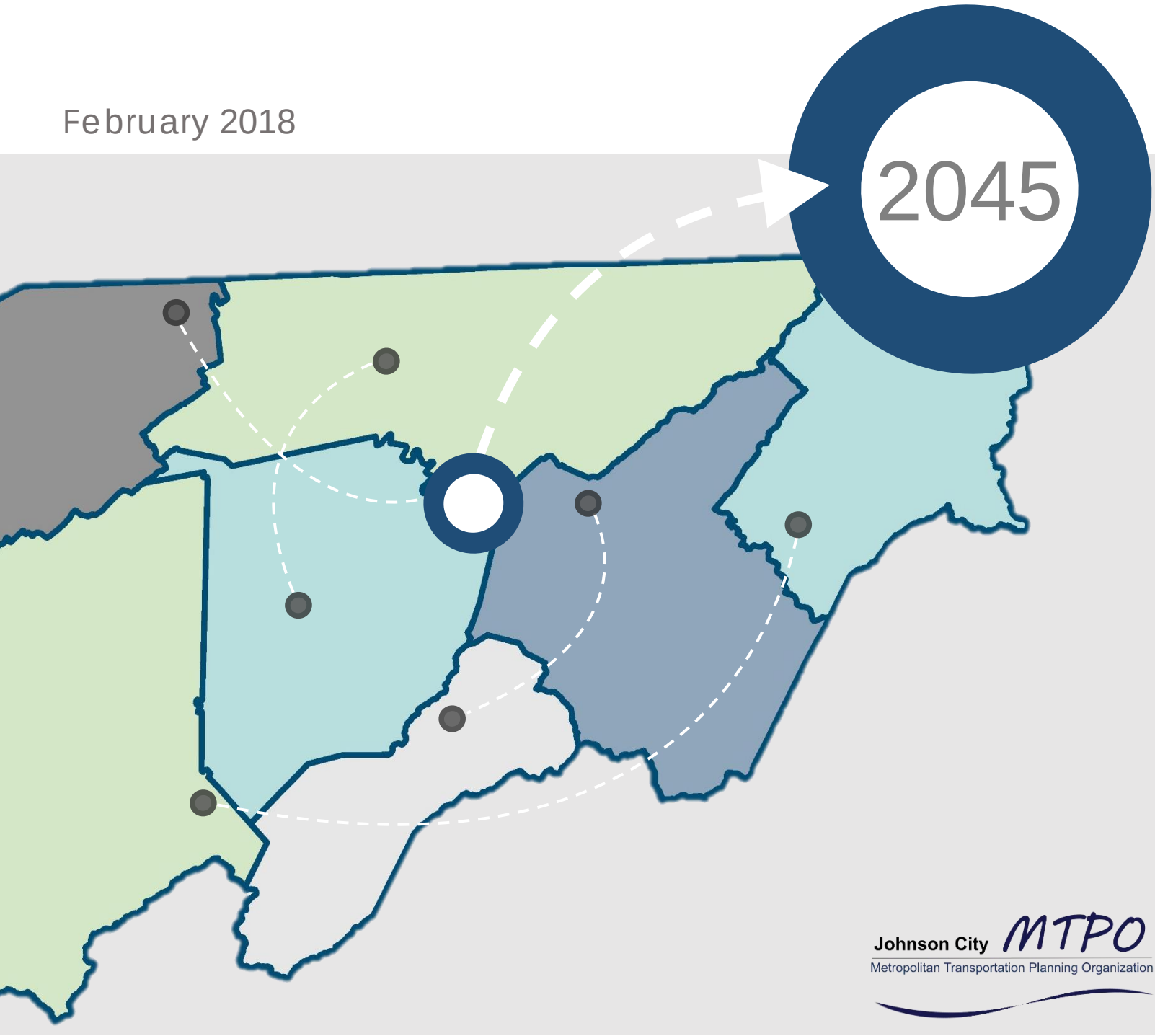
Johnson City MTPO

Metropolitan Transportation Plan

February 2018



Johnson City MTPO
Metropolitan Transportation Planning Organization

RESOLUTION 2018-01

RESOLUTION OF THE EXECUTIVE BOARD OF THE JOHNSON CITY METROPOLITAN TRANSPORTATION PLANNING ORGANIZATION (MTPO)
TO ADOPT THE JOHNSON CITY MTPO 2045 METROPOLITAN TRANSPORTATION PLAN

WHEREAS, the Johnson City MTPO is responsible for the transportation planning and coordination for the Johnson City Urbanized Area; and

WHEREAS, the Johnson City MTPO Executive Board has the authority to adopt plans and programs; and

WHEREAS, the development of a Metropolitan (Long-Range) Transportation Plan (MTP) was completed in accordance with Title 23 United States Code, Section 134, Metropolitan Transportation Planning; and

WHEREAS, various local, state, regional, and federal agencies, involved with transportation planning for the Johnson City Urbanized Area have cooperatively developed the Johnson City MTPO 2045 MTP; and

WHEREAS, the MTP has completed the required 30-calendar day public review and comment period;

NOW, THEREFORE, BE IT RESOLVED that the Executive Board and Executive Staff of the Johnson City MTPO does hereby adopts the Johnson City MTPO 2045 Metropolitan Transportation Plan.

MTPO Executive Board, Chairperson — Date: 2-22-2018

MTPO Executive Staff, Chairperson — Date: 22 FEB 2018

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FIGURES

TABLES

ACRONYM LIST

AADT	Annual Average Daily Traffic
ADA	Americans with Disabilities Act (ADA) of 1990
ADT	Average Daily Traffic
ADHS	Appalachia Development Highway System
AVL	Automated Vehicle Locator System
BEA	Bureau of Economic Analysis Economic Areas
BLOS	Bicycle Level of Service
BRR or BR	Bridge Replacement and Rehabilitation
CAA/CAAA	Clean Air Act or Clean Air Act Amendments
CBD	Central Business District
CIP	Capital Improvement Program
CMAQ	Congestion Mitigation and Air Quality Improvement Program
CO	Carbon Monoxide
CPTHSTP	Coordinated Public Transit Human Services Transportation Plan
CSS	Context Sensitive Solutions
E+C	Existing Plus Committed
EJ	Environmental Justice
EPA/USEPA	United States Environmental Protection Agency
FAA	Federal Aviation Administration
FAST Act	Fixing America's Surface Transportation Act
FH/PLHP	Forest Highway/Public Lands Highway Program
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
FY	Fiscal Year
GHG	Greenhouse Gas
GIS	Geographic Information System
HOV	High-Occupancy Vehicle Lanes
HPP	High Priority Projects
HSIP	Highway Safety Improvement Program
HUD/USHUD	United States Department of Housing and Urban Development
I	Interstate
IAC	Interagency Consultation
IM	Interstate Maintenance
IMC	Instrument Meteorological Conditions
INFRA	Infrastructure For Rebuilding America (INFRA) Grants
ITS	Intelligent Transportation Systems
JCT	Johnson City Transit
JIT	Just-In-Time Delivery
LOS	Level of Service
MAP-21	Moving Ahead for Progress in the 21st Century Act
MPA	Metropolitan Planning Area
MPH	Miles Per Hour
MPO	Metropolitan Planning Organization
MSA	Metropolitan Statistical Area
MTP	Metropolitan Transportation Plan
MTPO	Metropolitan Transportation Planning Organization

MUTCD	Manual on Uniform Traffic Control Devices
NAAQS	National Ambient Air Quality Standards
NCPD	National Corridor Planning and Development
ND	National Defense
NEPA	National Environmental Policy Act
NHFP	National Highway Freight Program
NHPP	National Highway Performance Program
NHS	National Highway System
NOx	Nitrogen Oxide
PDO	Property Damage Only
PGA	Planned Growth Area
PLOS	Pedestrian Level of Service
PPP	Public Participation Plan
RA	Rural Area
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SP	State Construction Program
SPPR	State Primary Pavement Rehabilitation
SR	State Route
STB	Surface Transportation Board
STBG	Surface Transportation Block Grant Program
STIP	State Transportation Improvement Program
STP	Surface Transportation Program
TAZ	Traffic Analysis Zone
TCA	Tennessee Code Annotated
TDM	Travel Demand Management
TDOSHS	Tennessee Department of Safety & Homeland Security
TDOT	Tennessee Department of Transportation
TE	Transportation Enhancement
TEA-21	Transportation Equity Act of the 21st Century of 1998
TIP	Transportation Improvement Program
TN	Tennessee
TSM	Transportation System Management
UGB	Urban Growth Boundary
US	United States
US DOT	United States Department of Transportation
USC	United States Code
V/C Ratio	Volume to Capacity Ratio
VHT	Vehicle Hours Traveled
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds

1 INTRODUCTION

Transportation is an integral part of everyone's life. Whether it is a trip to the grocery store or the commute to work, we all depend on some form of transportation. While formal community planning in Johnson City dates back to the early 1900s, regional transportation planning in the area did not emerge until the 1980s. Since that time, local, state, and federal agencies have taken a collaborative approach to planning and providing transportation solutions within the Johnson City region.

As a result of the 1980 US Census, the Johnson City Metropolitan Transportation Planning Organization (MTPO) was established in 1982. The creation of the MTPO was to comply with federal requirements that urbanized areas, such as Johnson City, provide a continuing, cooperative, and comprehensive approach to transportation planning for the region. At that time, the geographic limits of the urbanized area of Johnson City were much smaller, largely covering just the corporate limits of the City of Johnson City and a small portion of surrounding communities. Based on the 2010 US Census, the Johnson City urbanized area includes a much larger geographic area including portions of Washington, Carter, Sullivan, and Unicoi counties and the municipalities of Johnson City, Elizabethton, Jonesborough, Watauga, and Unicoi.

As the region develops this transportation plan, it must address three important questions. What does the future hold in store for this area relative to future growth and development? How well will the region's transportation system function? Lastly, how does the region balance these demands with the desires of existing residents and businesses when it comes to providing adequate and sound transportation choices?

The plan presented in this document provides a blueprint for transportation investments in the MTPO area through the year 2045. This plan is multimodal, meaning it addresses travel by all modes of the transportation system -- streets and highways, bikeways and walkways, public transportation, aviation, and rail. Consideration is given to population and employment trends, land development patterns, travel characteristics, current and future transportation system performance, and other planning factors. This plan was developed in coordination with the state and local agencies that are responsible for transportation, environmental protection, land use management, natural resources, and historic preservation. The recommended plan is based on a series of stated community goals, financial capability, environmental considerations, and public guidance.

The plan is organized into five main sections:

1. Strategic Direction of the MTPO and MTP
2. Population and Employment Trends
3. Multimodal Transportation System and Performance
4. Programming of Prioritized Investments
5. Project Impacts

2 STRATEGIC DIRECTION OF THE MTPO AND MTP

2.1 PURPOSE OF THE JOHNSON CITY MTPO

Federal law requires metropolitan areas (defined as urbanized areas with a population of greater than 50,000 people, based on the latest US Census) undertake a continuing, cooperative, and comprehensive transportation planning process. The Johnson City Metropolitan Transportation Planning Organization (MTPO) is the governing entity that is charged with carrying out this process for the Johnson City Urbanized Area. The planning area of the Johnson City MTPO includes the cities and towns of Bluff City, Johnson City, Elizabethton, Jonesborough, Unicoi, and Watauga as well as portions of Washington, Carter, Unicoi and Sullivan counties. Figure 3-1 illustrates the Johnson City MTPO area.

The Johnson City MTPO is comprised of an Executive Board, Executive Staff (agency technical staff), and MTPO staff. The Executive Board is the governing body of the MTPO and has the authority to adopt plans, programs, and policies. The Executive Board is comprised of elected officials from its member jurisdictions as well as the State of Tennessee. Additional members who have an advisory role include the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA).

The MTPO Executive Board has periodic meetings to discuss and vote on various policies and products. Final responsibility for transportation planning and programming is vested with the Executive Board.

The MTPO Executive Staff includes the chief administrator of governments and agencies having functional responsibility for transportation planning and implementation.

The MTPO staff is physically housed in the Johnson City Transit (JCT) operations center and is responsible for all planning and administrative functions of the MTPO. The MTPO staff serve as a liaison between the MTPO Executive Board, TDOT, FHWA, FTA, local governments, and other groups and individuals interested in transportation issues within the MTPO area. The MTPO staff takes their direction from, and are accountable to, the Executive Board and Executive Staff.

2.2 PLANNING PROCESS

2.2.1 Legal Requirements of the Plan

Federal legislation provides the guiding framework that governs the transportation planning process for all metropolitan planning organizations (MPOs) including the Johnson City MTPO.

The Fixing America's Surface Transportation (FAST) Act of 2015 continues the previously established requirement that each MPO develop a transportation plan with at least a 20-year horizon of both long-range and short-range strategies/actions. The plan is intended to lead to the development of an integrated multimodal transportation system to facilitate the safe and efficient movement of people and goods in addressing current and future transportation demand. The plan must be updated every five years to keep

consistent with existing conditions, re-evaluate proposed plans, programs and projects, and validate air quality conformity analysis.

The FAST Act legislation places continued emphasis on the relationships between land use, air quality, and transportation, including modes other than automobile. The Clean Air Act Amendments (CAAA) of 1977 and 1990 require that transportation plans, programs, and projects in non-attainment areas not cause or contribute to violations of the National Ambient Air Quality Standards (NAAQS).

Other requirements of the MPO planning process include compliance with a number of existing laws, regulations, and policy directives, which are described below.

- The Americans with Disabilities Act (ADA) of 1990 mandates equal opportunity for, and prohibits discrimination against, individuals with disabilities. In particular, Title II of the ADA and Section 504 of the Rehabilitation Act of 1973 requires State, local, and regional agencies to provide transportation programs, services, and activities that are accessible to all individuals.

- Title VI of the Civil Rights Act of 1964 prohibits discrimination on the basis of race, color, or national origin. Section 162a of the Federal-Aid Highway Act of 1973 to 1976 (section 324, Title 23 U.S.C.), the enabling legislation of the Federal Highway Administration (FHWA), prohibits discrimination based on gender.

- The Uniform Relocation Assistance and Real Property Acquisition Act of 1970 prohibits unfair and inequitable treatment of persons as a result of projects that are undertaken with federal financial assistance. The Civil Rights Restoration Act of 1987 clarified the intent of Title VI to include all programs and activities of federal aid recipients and contractors whether those programs and activities are federally-funded or not. Environmental Justice is a concept founded in the intent of the non-discrimination prohibitions of the federal legislation.

- The incorporation of Environmental Justice and non-discrimination principles into transportation planning and decision-making processes as well as project-specific environmental reviews as founded in Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* and reaffirmed in both the United States Department of Transportation (US DOT) Order 5610.2 (a), *Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* and FTA Circular 4703.1 *Environmental Justice Policy Guidance for Federal Transit Administration Recipients*. These policy directives require federal agencies and grant recipients of federal funds to identify and address disproportionately high and/or adverse environmental or human health effects that any of its programs, policies, and/or activities may have on minority and low-income populations. Further, each agency and grant recipient must work to prevent the denial, reduction, or delay of benefits received by minority and low-income

populations and must develop policies and strategies to ensure full and fair participation by affected populations in transportation decisions.

- There are two important aspects to climate change when it comes to planning for transportation investments. While a much debated topic, there is general scientific consensus that the earth is experiencing a warming trend and that human-induced increases in atmospheric greenhouse gases (GHGs) are a contributing factor. Because transportation-related GHG emissions are a large contributor to atmospheric GHGs, MPOs, through their transportation planning and investment decisions, are called to increase their considerations and strategies to mitigate the effects of global climate change by reducing GHG emissions from transportation. Secondly, considerable research supports MPO consideration of transportation vulnerability due to climate change and extreme weather events and options for improving resiliency of transportation facilities or systems to climate changes and/or extreme weather events. The MTP provides an excellent forum for laying the groundwork for this consideration.

- In 2009, the US DOT, the US Department of Housing and Urban Development (HUD), and US EPA announced a new Interagency Partnership for Sustainable Communities to improve access to affordable housing, provide more transportation options, and lower transportation costs while protecting the environment in communities nationwide. The partnership established six livability principles: provide more transportation choices; promote equitable-affordable housing; enhance economic competitiveness; support existing communities; coordinate and leverage policies and investments; and value communities and neighborhoods. MPOs are encouraged to incorporate these livability principles into their plans and programs to ensure that transportation investments support both mobility and broader community goals.

The 2045 MTP for the Johnson City MTPO reflects compliance with the federal requirements of the FAST Act, the CAAA, and the above provisions. Throughout this document, data and analysis are presented illustrating consideration and compliance with these requirements.

2.2.2 Plan Adoption and Amendment Process

Developing and updating a metropolitan transportation plan (MTP) takes considerable time (generally 12 to 18 months or longer) given the amount of data and information that must be considered in the plan. As part of the plan development process, opportunities are provided for public and stakeholder input, which is an important activity in determining transportation needs and priorities, and aiding in the ultimate recommendations of the plan. Appendix I provides details on the outreach and involvement processes used in the development of the 2045 MTP and the input received.

Once a draft plan has been developed, a formal review process is required of the draft document. This review process includes an initial review by state and federal agencies

of the draft plan to ensure compliance with various federal transportation planning requirements. Once this review is completed a formal public review and comment period of the draft MTP is conducted, which is a minimum of 30-days. After the MTPO has initiated the public review process on the draft MTP, the MTPO generally holds an advertised public meeting to review and obtain final comments from the public. At the end of the public comment period and after public comments have been addressed or considered, the MTPO endorses/adopts the MTP and submits it to the appropriate state and federal agencies.

Amendments to the MTP can and do occur once a plan has been adopted. These amendments can occur for various reasons – changes in project schedules and costs, unknown development changes, or changes in priorities. While the intent is to avoid such mid-cycle changes, amendments do occur. Any such amendment to the MTP must follow the same public review process and procedures as that of adopting the plan, as per the MTPO's Public Participation Plan (PPP) (available at: www.jcmpo.org/ppp.html).

2.2.3 Plan Implementation

Implementation of project recommendations from the MTP occurs through the programming of transportation improvements on a scheduled basis, which is linked to annual state and federal funding appropriations. For projects within the MTPO area that are federally or state funded or considered regionally significant, the MTPO, in consultation with the appropriate member jurisdictions, TDOT, and transit agencies, with input from the public, determines which projects are to be advanced from the MTP into the MTPO's short-term Transportation Improvement Program (TIP).

The TIP is a planning/programming document developed and adopted by the MTPO in response to transportation goals, priorities, and needs in the MTPO area as presented in the MTPO's MTP. The TIP is a 4-year program for all modes of transportation that is updated every three years. It not only addresses major transportation improvements (e.g. constructing a new bridge or road), but it also contains small-scale transportation improvements (e.g. intersection or signalization improvements) as well as transit and other transportation investments (e.g. purchasing new transit vehicles or constructing a new sidewalk or bikeway facility). Projects that are added to the TIP for funding and implementation must be consistent with the goals, priorities, project recommendations, and strategies of the MTP. This consistency ensures for a continuing, cooperative, and comprehensive planning process that guides development of integrated planning and decision-making by the MTPO.

The MTPO also maintains an annual/biannual work program (referred to as the Unified Planning Work Program or UPWP) that outlines the planning activities in the region to be undertaken by the MTPO during the fiscal year. Planning activities of the MTPO are influenced by the goals and priorities of the MTP and frame a large portion of the MTPO's work program activities. Examples of these activities, which support implementation of the MTPO's MTP, include undertaking subarea and sub-regional studies that allow for the MTPO to better understand transportation needs in the region, maintaining avenues and opportunities for public and stakeholder input on projects and decisions by the MTPO, and updating planning data and tools for future analysis of transportation needs in the

region. Additionally, the MTPO is actively involved in monitoring and coordinating projects from the MTP into the TIP. Through this continuous planning process, the MTPO plays an active role in implementing the recommendations of the MTP and supporting an integrated planning process within the MTPO area.

2.3 GOALS AND OBJECTIVES

This section describes a set of stated goals and objectives that have been developed to guide the 2045 MTP. During 2017, the MTPO Executive Board and Executive Staff, with the assistance of public input, established a series of guiding principles. These principles are aligned with national transportation policies to serve in the development of the 2045 MTPO MTP. From each goal, a set of objectives intended to move the region closer to the stated guiding principles has been established.

2.3.1 Planning Factors, Emphasis Areas, and Performance Measures

The FAST Act, which was signed into law in 2015, is the current national transportation legislation providing the guiding principles behind transportation decision-making throughout the United States in metropolitan areas.

The FAST Act established the following ten Planning Factors to guide transportation decisions:

1. Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency.
2. Increase the safety of the transportation system for motorized and non-motorized users.
3. Increase the security of the transportation system for motorized and non-motorized users.
4. Increase the accessibility and mobility options available to people and for freight.
5. Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and state and local planned growth and economic development patterns.
6. Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight.
7. Promote efficient system management and operation.
8. Emphasize the preservation of the existing transportation system.
9. Enhance travel and tourism.
10. Improve the resiliency of the transportation system and reduce or mitigate stormwater impacts of surface transportation.

The USDOT has also identified the following three Planning Emphasis Areas for MPOs to consider in their planning processes.

1. Models of Regional Planning Cooperation

   The Johnson City MTPO will promote cooperation and coordination across MPO boundaries to ensure a regional approach to transportation planning. A memorandum of agreement (MOA) between the Johnson City MTPO and the

Kingsport MTPO designates that the Johnson City MTPO will conduct planning activities in the portion of the Kingsport Urbanized Area which is currently within the Johnson City city limits. The Kingsport and Johnson City Urbanized Areas are adjacent and the Johnson City MTPO MPA boundary extends into the Kingsport Urbanized Area. The MOA defines the planning responsibilities for each MTPO MPA boundary.

The three MPOs in the Tri-Cities area, which are Bristol, Kingsport and Johnson City, continue to promote regional transit planning through meetings that involve all three MPOs, all three urban transit providers, the rural transit provider, along with elected officials and administrators from 16 jurisdictions.

The MTP was developed in consultation and in cooperation with surrounding MPOs in the Tri-Cities region as it relates to population and employment forecasts, provision of transit services, and regional connectivity.

2. Access to Essential Services

   The Johnson City MTPO, as part of the transportation planning process, has identified transportation connectivity gaps in access to essential services. The Coordinated Public Transit – Human Services Transportation Plan is a joint effort of the Johnson City MTPO and Johnson City Transit that identifies gaps in transit services and determines cost effective improvements that result in a better transit system. This effort was completed in conjunction with the MTP allowing for greater understanding of connectivity gaps between essential services, providers, and users. The MTP investment plan reflects increased funds for transit and walking and biking as a means of increasing access to essential services.

3. MAP-21 and FAST Act Implementation

   The MTP establishes a clear link to the advancement of MAP-21 and FAST Act performance-based planning provisions. The Johnson City MTPO will continue to participate in the development and implementation of a performance management approach to transportation planning and programming, which will include the development and use of performance measures, target setting, performance reporting, and transportation investments that support the achievement of performance targets.

In addition to the above Planning Factors and Emphasis Areas, federal transportation legislation (first enacted under MAP-21) outlines the following national performance management measures to guide the focus of the Federal-aid highway program:

- Safety - To achieve a significant reduction in traffic fatalities and serious injuries on all public roads
- Infrastructure Condition - To maintain the highway infrastructure asset system in a state of good repair
- Congestion Reduction - To achieve a significant reduction in congestion on the National Highway System

- System Reliability - To improve the efficiency of the surface transportation system
- Freight Movement and Economic Vitality - To improve the National Highway Freight Network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development
- Environmental Sustainability - To enhance the performance of the transportation system while protecting and enhancing the natural environment
- Reduced Project Delivery Delays - To reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies' work practices

These factors, emphasis areas, and goals provide the foundation for which locally desired regional outcomes are established. Table 2-1 illustrates how the 2045 MTP goals, which are further described in the following section and throughout the MTP, address each of these planning factors.

2.3.2 Regional Goals

The following goals and objectives have been established with full consideration of the above FAST Act Planning Factors and National Goals. The 2045 MTP goals are intended to guide future transportation decisions in the region. For each of the following goals, a corresponding set of objectives has been established to help the region move closer to the intended goal.

Goal #1: Improve Safety and Security throughout the Transportation System of the MTPO Area

- Encourage partnerships with other transportation and non-transportation agencies to enhance transportation safety and security
- Reduce secondary traffic accidents
- Establish initiatives (projects and programs) to improve the safety and security of vulnerable roadway users (e.g. pedestrians, cyclists, transit riders, and the young and old)

Goal #2: Reduce Traffic Congestion along Major Routes of the MTPO Area

- Reduce travel delays between major areas of attractions in the MTPO study area
- Seek cost-effective management solutions and new technologies as a means of addressing congestion, reducing transportation delay, improving travel time reliability, and improving system operations
- Increase transit and other transportation demand management opportunities
- Enhance the flow of raw materials and manufactured products

Goal #3: Promote Economic Growth and Livability by Enhancing the Transportation System for the MTPO Area

- Maintain what we have – take a "state of good repair" approach to our community's transportation assets
- Remove obstacles to economic growth through improved transportation facilities and the integration and connectivity of the transportation system, across and between modes, for people and freight thus allowing for the continued expansion of the business community
- Promote alternative forms of transportation (such as walking, biking, and transit) where possible
- Seek improvement options and strategies which minimize adverse impacts of surface transportation to historical, social, cultural, and natural environments, including stormwater impacts, and reduce transportation impacts on air-quality

Goal #4: Enhance Regional Access to and from the MTPO Area

- Maintain and improve access to regional areas outside of the MTPO study area
- Support transportation investments and policies that work to create jobs and improve access to people, tourism, places, and goods while embracing access management and corridor management strategies that preserve the long-term functionality of a roadway's capacity and safety
- Strategically target transportation investments to areas supportive and conducive to growth and redevelopment initiatives

Table 2-1 MTP Goals Addressing FAST Act Planning Factors

FAST Act Planning Factor	Plan Goal
1. Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency.	4
2. Increase the safety of the transportation system for motorized and non-motorized users.	1
3. Increase the security of the transportation system for motorized and non-motorized users.	1
4. Increase the accessibility and mobility options available to people and for freight.	2
5. Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and state and local planned growth and economic development patterns.	3
6. Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight.	4
7. Promote efficient system management and operation.	2
8. Emphasize the preservation of the existing transportation system.	3
9. Enhance travel and tourism	4
10. Improve the resiliency of the transportation system and reduce or mitigate stormwater impacts of surface transportation	3

2.3.3 Performance Measures

As previously stated, federal transportation legislation places greater emphasis on system performance and national performance management measures to guide a performance-based planning process at the metropolitan and state level. States, MPOs, and operators of public transportation are required to establish and coordinate targets they set in key national performance areas, linking planning and programming to performance targets.

In January 2017, FHWA and FTA promulgated the remaining set of final rules on performance measures to assess performance in 12 areas of the Federal-aid highway program and for transit agencies that receive FTA Federal financial assistance (under 49 U.S.C.). Specifically, these agencies are expected to set performance targets to monitor, assess, and utilize to improve the state of good repair of their capital assets and the safety performance of their public transportation systems.

Table 2-2 provides a summary of these nationally-established measures. By May 27, 2018, MPOs, states, and public transportation providers are required to have jointly agreed upon provisions for cooperatively developing and sharing information related to transportation performance data, the selection of performance targets, the reporting of performance targets, and the reporting of performance. The MTPO's next MTP will be highly influenced by these performance measures, targets, and progress toward attainment of critical outcomes.

Table 2-2 National Transportation Performance Measures

Rulemaking	23 CFR & 49 CFR	Final Performance Measures	Measure Applicability
Safety PM Final Rule			
	Part 490.207(a)(1)	Number of fatalities	All public roads
	Part 490.207(a)(2)	Rate of fatalities	All public roads
	Part 490.207(a)(3)	Number of serious injuries	All public roads
	Part 490.207(a)(4)	Rate of serious injuries	All public roads
	Part 490.207(a)(5)	Number of non-motorized fatalities and non-motorized serious injuries	All public roads
Infrastructure PM Final Rule			
	Part 490.307(a)(1)	Percentage of pavements of the Interstate System in Good condition	The Interstate System
	Part 490.307(a)(2)	Percentage of pavements of the Interstate System in Poor condition	The Interstate System
	Part 490.307(a)(3)	Percentage of pavements of the non-Interstate NHS in Good condition	The non-Interstate NHS roadways
	Part 490.307(a)(4)	Percentage of pavements of the non-Interstate NHS in Poor condition	The non-Interstate NHS roadways
	Part 490.407(c)(1)	Percentage of NHS bridges classified as in Good condition	NHS
	Part 490.407(c)(2)	Percentage of NHS bridges classified as in Poor condition	NHS
System Performance PM Final Rule			
	Part 490.507(a)(1)	Percent of the Person-Miles Traveled on the Interstate that are Reliable	The Interstate System
	Part 490.507(a)(2)	Percent of the Person-Miles Traveled on the Non-Interstate NHS that are Reliable	The non-Interstate NHS roadways
	Part 490.507(b)	Percent Change in Tailpipe CO2 Emissions on the NHS Compared to the Calendar Year 2017 Level	NHS
	Part 490.607	Truck Travel Time Reliability (TTTR) Index	The Interstate System
	Part 490.707(a)	Annual Hours of Peak Hour Excessive Delay Per Capita	The NHS in urbanized areas with a population over 1 million for the first performance period and in urbanized areas with a population over 200,000 for the second and all other performance periods that are also in nonattainment or maintenance areas for ozone (O3), carbon mon- oxide (CO), or particulate matter (PM10 and PM2.5)
	Part 490.707(b)	Percent of Non- Single Occupant Vehicle (SOV) Travel	
	Part 490.807	Total Emissions Reduction	All projects financed with funds from the 23 U.S.C. 149 CMAQ program apportioned to State DOTs in areas designated as non-attainment or maintenance for ozone (O3), carbon monoxide (CO), or particulate matter (PM10 and PM2.5)
Transit Performance PM Final Rule			
	Part 670	Public Transportation Safety Program - provides the framework for FTA to monitor, oversee, and enforce transit safety, based on the methods and principles of Safety Management Systems.	Performance targets based on the safety performance criteria
	Parts 625 and 630	Transit Asset Management - defines the term "state of good repair" and establishes minimum Federal requirements for transit asset management.	Performance measures for Equipment, Rolling Stock, Infrastructure, and Facilities

3 POPULATION AND EMPLOYMENT TRENDS

3.1 EXISTING AND FUTURE CONDITIONS

The Johnson City region is situated near the borders of northeastern Tennessee and northwestern North Carolina in an area commonly referred to as the Tri-Cities region. The Johnson City MTPO planning area is one of three urbanized areas (UZAs) in the Tri-Cities region (Bristol and Kingsport are the other two areas). The Johnson City MTPO planning area is comprised of approximately 398 square miles and includes the cities and towns of Bluff City, Johnson City, Elizabethton, Jonesborough, Unicoi, and Watauga as well as portions of Washington, Carter, Unicoi and Sullivan counties.

Figure 3-1 illustrates the UZA and metropolitan planning area (MPA) of the Johnson City MTPO.

What is an Urbanized Area (UZA)?

An Urbanized Area is a statistical geographic entity designated by the US Census Bureau, consisting of a central core and adjacent densely settled territory that together contain at least 50,000 people, generally with an overall population density of at least 1,000 people per square mile. Within the transportation planning community an Urbanized Area is typically referred to as a UZA.

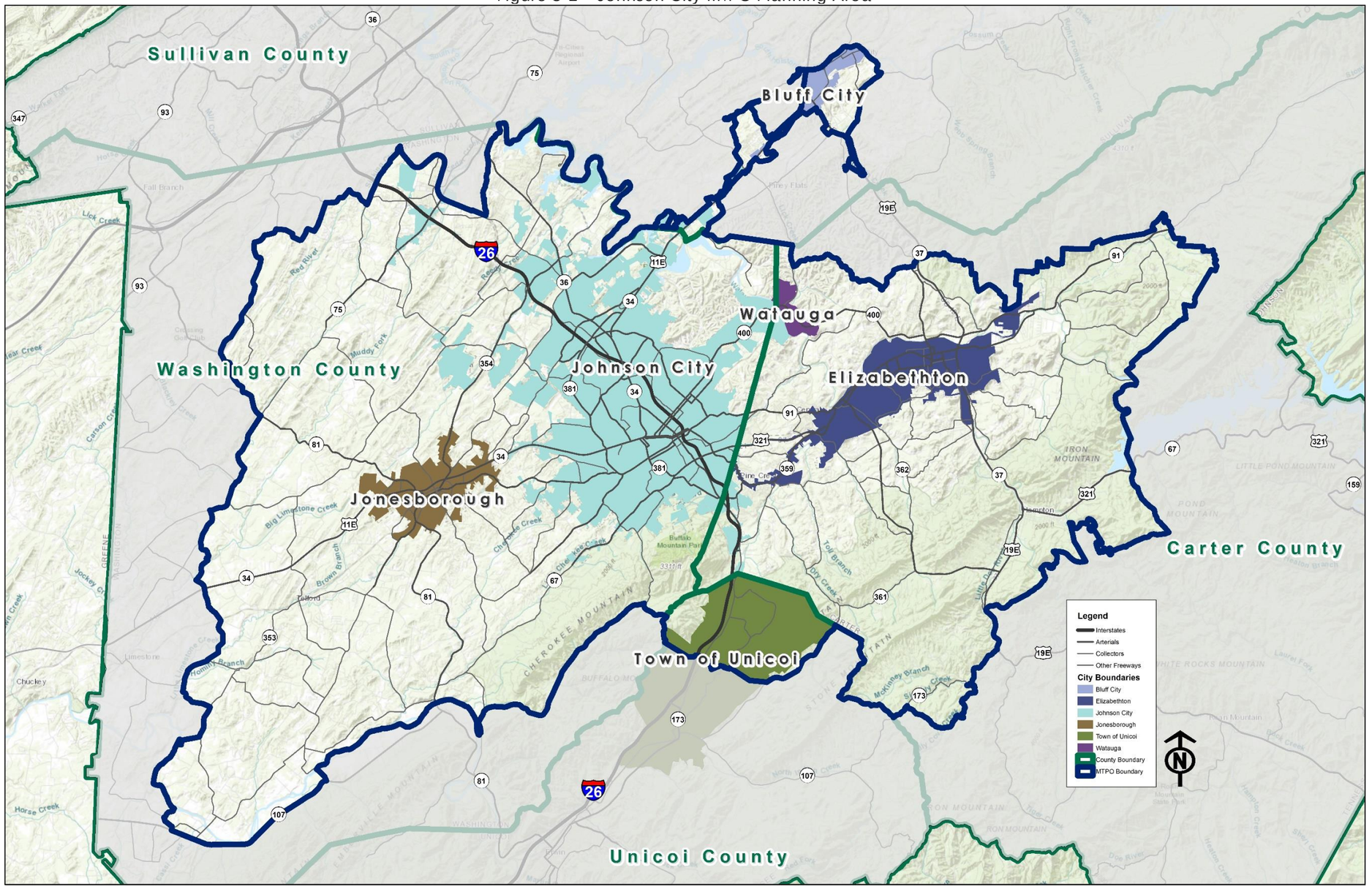
What is a Metropolitan Planning Area (MPA)?

A Metropolitan Planning Area is defined in the Code of Federal Regulations (23 CFR 450.104) as the geographic area in which the metropolitan transportation planning process must be carried out. The MPA boundary, at a minimum, is to cover a UZA and the contiguous geographic areas likely to become urbanized within the 20-year forecast period covered by the transportation plan.

Since 1982, when the Johnson City area was first designated by the federal government as a UZA, the region has experienced steady population and employment growth and has seen a shift in its employment base from largely manufacturing to one of service and retail. Another change in the region has been an increase in the percent of persons over the age of 65, a trend that is occurring nationally as more Americans are living longer. In the 1970s, less than 10% of the population within the MTPO was over 65 years of age. In 2015, approximately 20% of the population is over the age of 65, and that trend is projected to increase to nearly 25% by the year 2045. While some retirees are moving to the area, according to US Census data, the projected increases in this population group are largely associated with the aging of older residents. Additionally, people are not only living longer, but the Baby Boomers, a huge age cohort, are now nearing or at retirement age, which accounts for a portion of the increase in persons over the age of 65.

This section describes the community structure of the MTPO area in terms of population and employment trends and forecasts, the region's natural and cultural environment, and current and future land use activities. Included in the discussion are the plans and policies that guide growth and development within the region. State and local agencies assisted in determining the latest available estimates and assumptions for land-use, population, travel, employment, congestion, and economic activity, which were utilized in the development of this plan.

Figure 3-1 Johnson City MTPO Planning Area



3.2 POPULATION AND HOUSING

This sub-section discusses the population, age, housing, and employment characteristics of the MTPO area. Historical data is presented along with future year projections. For purposes of this plan, the base year is 2015 and future year projections are to the year 2045.

Population Trends and Forecasts

In 2010, the total population of the Johnson City planning area was approximately 159,720 people. By 2045, the MTPO's planning area is projected to have 208,798 people, which is a 31% increase over the 2015 population. It should be noted that the MTPO planning area was adjusted after the 2010 census to account for changes in the region's urbanized area. Table 3-1depicts recent population trends and projections for the MTPO area. Figure 3-2 illustrates the projected absolute increase in population for the MTPO area from 2015 to 2045. Traffic Analysis Zones (TAZs) are the geographical unit for this figure and are used as the building blocks for the travel demand model explained later in this document.

Table 3-1 Total Population (2010-2045)

	2010	2015	2045	Absolute Change (2015-2045)	Percent Change (2015-2045)
Johnson City MPA	159,720	159,561	208,798	49,237	30.9%
Carter County	57,424	58,066	69,138	11,072	19.1%
Sullivan County	156,856	157,366	166,896	9,530	6.1%
Unicoi County	18,313	18,144	18,823	679	3.7%
Washington County	122,979	128,307	175,179	46,872	36.5%
4-County Population	355,572	361,883	430,036	68,153	18.8%
MTPO% of 4-County Population	44.9%	44.1%	48.5%	--	

Sources: US Census, Woods & Poole Economics, Inc.

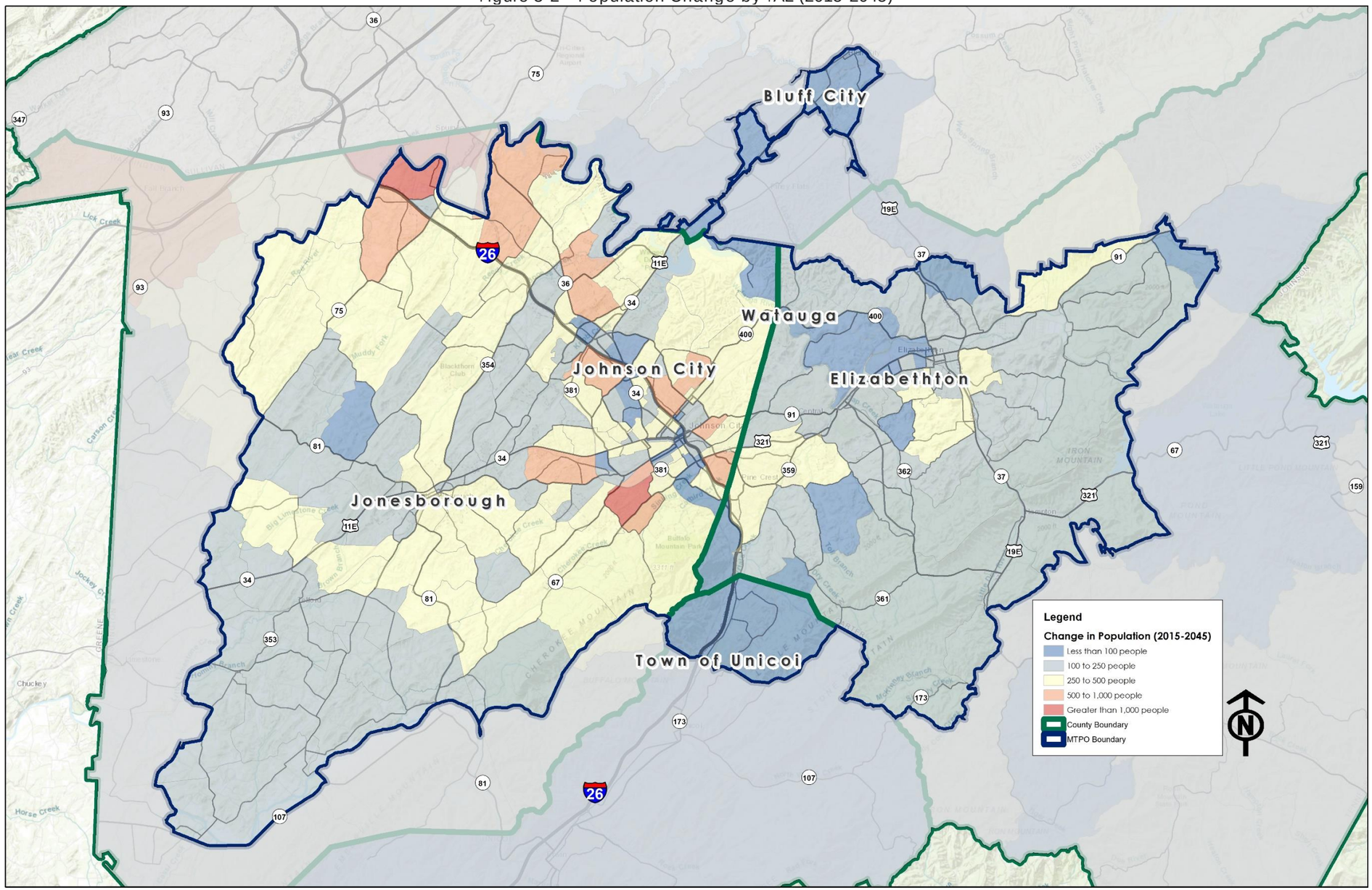
The current MTPO planning boundary is intended to reflect the area of the region which is likely to be urbanized in the next 20 years. The population density in 2015 for the MTPO area was 456 persons per square mile. Assuming the MTPO planning boundary remained the same as it is today – the population density of the MTPO area would increase to 597 persons per square mile by 2045. Table 3-2 illustrates the number of persons per square mile (or density level) within the MTPO area.

Table 3-2 MTPO Area Population Density (2015-2045)

	2015	2045
Total Population	159,561	208,798
Land Area (sq. miles)	350	350
People per Sq. Mile	456	597

Sources: US Census, Woods & Poole Economics, Inc.

Figure 3-2 Population Change by TAZ (2015-2045)



Age Trends and Forecasts

Another trend in the MTPO area that has continued to increase over time and is projected to continue to increase is the number of persons aged 65 and older. In 1970, all four counties in the MTPO region had less than 10% persons aged 65 and older. In 2015, that number is closer to 20% and by 2045 nearly 25% of the region's population will be aged 65 and older. Table 3-3 depicts these changing age demographics within the MTPO area, a trend that is consistent with state and national trends of an aging US population.

Table 3-3 MTPO Area Population Aged 65 and Over Trends (1970-2045)

	1970	2010	2015	2045	Percent Change (2015-2045)
Carter County	4,162	9,842	11,606	17,266	49%
Sullivan County	9,968	29,362	32,833	46,214	41%
Unicoi County	1,704	3,609	4,061	5,600	38%
Washington County	7,670	18,907	22,099	36,037	63%
Total 4-County Region	23,504	61,720	70,599	105,117	49%
Total Population 4-County Region	260,798	355,838	361,883	430,036	19%
Percent 65+	9%	17%	20%	24%	25%

Source: Woods & Poole Economics, Inc.

Providing transportation options within the region to accommodate these trends will require higher levels of investments in transit services, walking, and biking over time in meeting the needs of this growing population group. Equally important will be housing placement in relation to other uses (e.g. grocery, stores, medical, recreation, etc.) to reduce transportation costs and provide mobility independence.

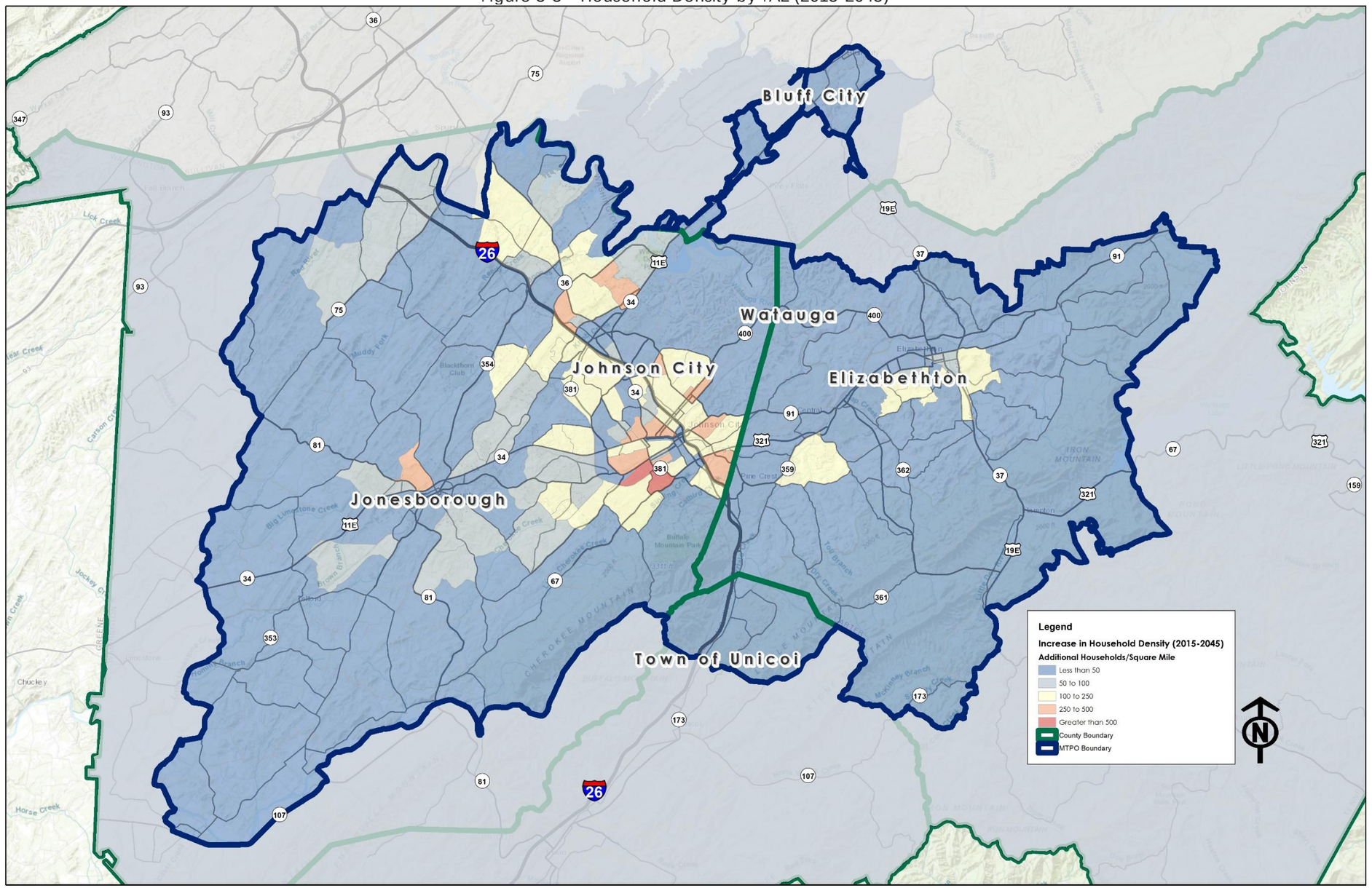
Household Trends and Forecasts

The increase of households within the MTPO area is projected to mirror the rate of increase in population over the planning horizon. In 2015, the number of households within the MTPO area was 73,118. By 2045, the number of households is projected to grow to 92,395. Table 3-4 and Figure 3-3 illustrate the number of households and density level of households within the MTPO area by TAZ. As illustrated in the household density map, while outward growth is projected, density levels are expected to increase from current concentration areas. Higher residential density makes walking, biking, and transit transportation a more viable option compared to serving a region with low-density or geographically segregated development patterns which discourage or prohibit shorter trips. As seen in Table 3-4, the average persons per household is not expected to change significantly over the planning horizon.

Table 3-4 MTPO Area Household Trends (2015-2045)

	2015	2045	Percent Change (2015-2045)
Total Households	73,118	90,941	24%
Land Area (Sq. miles)	350	350	-
Households per Sq. Mile	209	260	24%
Persons per Household	2.28	2.35	3%

Figure 3-3 Household Density by TAZ (2015-2045)



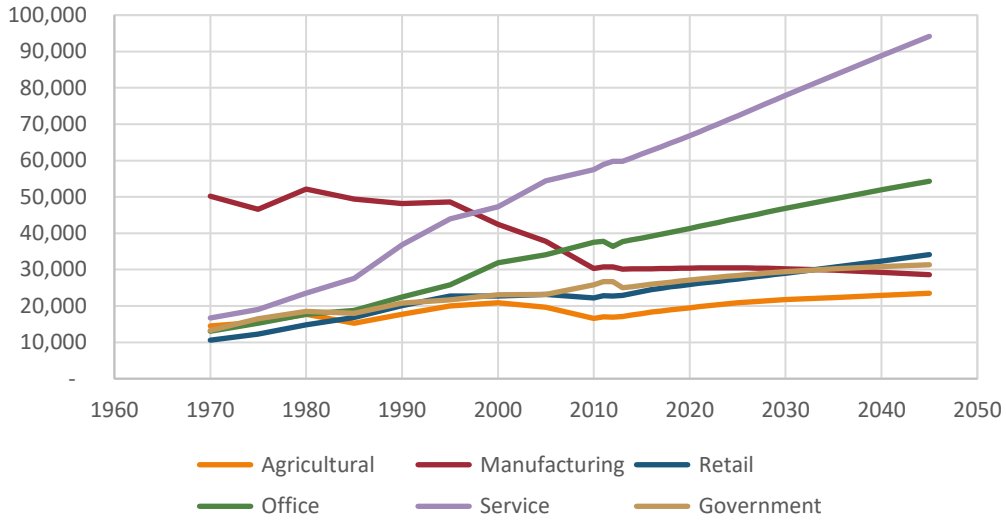
3.3 EMPLOYMENT

Employment conditions within the MTPO area, much like in many communities in the Southeast, have seen dramatic changes over the last several decades relative to the number of jobs and types of jobs, which make up the local economy. Figure 3-4 illustrates the change in the number of jobs, and types of jobs from 1970 to 2045 for the counties of Carter, Sullivan, Unicoi, and Washington. In the 1970s and 1980s, the employment of the 4-county region and the MTPO area was largely dominated by manufacturing jobs. Since that time, the region, much like the rest of the country, has seen a leveling off of manufacturing employment. While manufacturing is no longer the leading employment sector in the region, the MTPO area and the region have continued to see positive growth in retail, service, and office employment, specifically medical employment.

In 2015, service sector employment (which consists of healthcare, education, and food services) accounted for 43% of the jobs within the MTPO area while manufacturing accounted for 14% and office (which consists of IT, financial, insurance, real estate, and other professional) accounts for 18%. By 2045, employment in the 4-county region is projected to reach 266,042, adding 67,845 new jobs to the 4-county region. Of this growth, the MTPO area is projected to receive 40,290 new jobs (accounting for 59% of the 4-county region's employment growth by 2045).

Table 3-4 and Figure 3-5 illustrate employment trends and forecasts within the MTPO area (and 4-county region) including projected employment concentrations by TAZ. With a projected 54% increase in employment over the planning horizon, job opportunities within the MTPO area appear to be strong. As previously mentioned, job growth in the region has seen a shift from largely manufacturing to a more service related economy. Changes in employment type from shift work to one that is consumer dependent will result in changing travel patterns over time. An example of this type of travel behavior change can be seen on corridors such as North State of Franklin Road (SR 381) with high amounts of commercial development and traffic volumes during mid-day that are reaching the traditional AM and PM commuting traffic volumes.

Figure 3-4 Employment Trends (1970-2045)



Source: Woods & Poole Economics

Table 3-5 MTPO Area Total Employment (2015-2045)

MTPO Counties	2015 Jobs	Percent of 4-County Region's 2015 Jobs	2045 Jobs	Percent of 4-County Region's 2045 Jobs	Absolute Change (2015-2045)	Percent Change (2015-2045)
Carter County	20,768	10%	28,042	11%	7,274	35%
Sullivan County	92,763	47%	110,970	42%	963	13%
Unicoi County	7,216	4%	8,179	3%	18,204	20%
Washington County	77,450	39%	118,850	45%	41,404	54%
4-County Region Total	198,197	--	266,042	--	67,845	34%
MTPO Area Total	75,025	38%	115,315	43%	40,290	59%

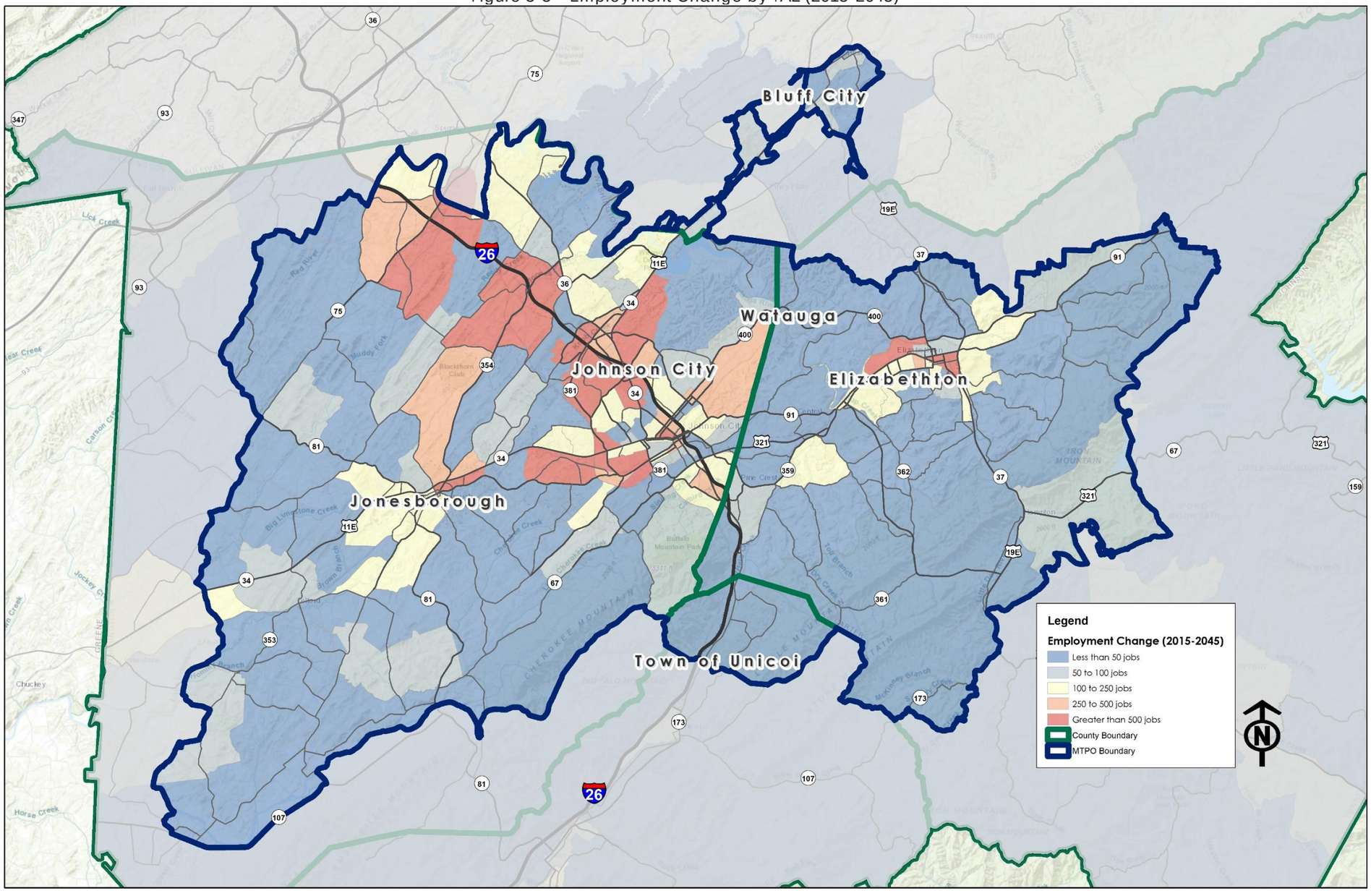
Sources: U.S. Census, Woods & Poole Economics, Inc.

Table 3-6 identifies the ten largest employers (in terms of number of employees) within the MTPO area. These ten employers account for approximately 20% of all jobs (or 15,440 jobs) within the MTPO area.

Table 3-6 Ten Largest Employers

Employer	County	No. of Employees
Mountain States Health Alliance	Washington	3,500
East Tennessee State University	Washington	2,370
Citi Commerce Solutions	Washington	2,078
VA Medical Center – Mountain Home	Washington	1,800
Advanced Call Center Tech	Washington	1,500
Frontier Health	Washington	1,200
American Water Heater Company	Washington	1,100
Doctor's Assisted Wellness	Washington	646
Vein Co	Washington	646
Aeronautical Accessories	Sullivan	600

Figure 3-5 Employment Change by TAZ (2015-2045)



3.4 LAND USE AND SUITABILITY

This sub-section describes the MTPO area's natural and cultural environmental features, current and future land use activities, and plans and policies that guide growth and development activities.

Natural Environment

The natural environment often dictates the pattern of land use and development in a community as well as influences the type and location of its transportation infrastructure. Climate, air and water quality, topography and geology, and watersheds and tributaries are significant natural factors that affect growth and development and are important to understand and consider in the development of a community's transportation system. The following is a listing of these factors and their impact on the region's transportation system:

Climate

The climate of the MTPO region can be characterized as continental and warm-to-temperate. Winters are short and cool with the average temperature being about 30 degrees Fahrenheit. The summer season is warm with an approximate average temperature of 77 degrees Fahrenheit. The mean annual rainfall, which is fairly well distributed throughout the year, averages approximately 43 inches. Severe storms are rare, and winters are generally mild and clear.

Climate change has become an increasingly important policy issue. While a much debated topic, there is general scientific consensus that the earth is experiencing a warming trend and that human-induced increases in atmospheric greenhouse gases (GHGs) are a significant cause. The combustion of fossil fuels is by far the biggest source of GHG emissions. In the United States, transportation is the largest source of GHG emissions, after electricity generation. Transportation accounts for 27% of United States greenhouse gas emissions based on recent data (https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions).

Scientists refer to what has been happening in the earth's atmosphere over the past century as the "enhanced greenhouse effect." By pumping man-made greenhouse gases into the atmosphere, humans are altering the process by which naturally occurring greenhouse gases trap the sun's heat before it can be released back into space. Since the beginning of the industrial revolution, atmospheric concentrations of carbon dioxide have increased nearly 30%, methane concentrations have more than doubled, and nitrous oxide concentrations have risen by about 15%. These increases have enhanced the heat-trapping capability of the earth's atmosphere which has led to a decrease in the polar ice caps and an increase in sea levels. Such trends are a particular threat to coastal communities in the US and around the world due to their vulnerability to flooding and increased tropical storm activity.

A wide range of strategies are available to reduce GHG emissions from the transportation sector. Section 6.0 of this Plan describes these strategies and what actions the MTPO can undertake to contribute to reductions in GHG emissions.

Air Quality

The US Environmental Protection Agency (EPA) sets national standards for pollutants such as volatile organic compounds (VOCs) and nitrogen oxides (NOx), which are precursors of ozone formation. The EPA designates areas that exceed the set pollutant levels as "non-attainment." The FAST Act legislation places continued emphasis on the relationships between land use, air quality, and transportation, including modes other than single-occupancy automobiles. The Clean Air Act Amendments (CAAA) of 1977 and 1990 require that transportation plans, programs, and projects in non-attainment areas not cause or contribute to violations of the National Ambient Air Quality Standards (NAAQS). In the 1970s, EPA established a 1-hour ozone standard. Originally set at 0.08 parts per million (ppm) in 1971, the 1-hour ozone standard was revised in 1979 to 0.12 ppm. In July 1997, EPA replaced the 1-hour standard with an 8-hour standard of 0.08 parts per million. The 8-hour standard was delayed nationally in implementation due to legal challenges, which were ultimately resolved in 2002.

In April 2012, EPA issued final area designations for the 2008 ozone standards and the Johnson City MTPO area was not classified as nonattainment (meaning the region is in compliance with national air quality standards). Additionally, EPA has designated all counties in Tennessee as "attainment/unclassifiable" for 2015 ozone NAAQS. While the region is not required to undertake air quality conformity analysis of its MTP, the MTPO has developed the 2045 MTP so that conformity testing can be undertaken should the region be designated non-attainment in the future. Projects in the MTP have been coded in the MTPO's travel demand model by horizon year, consistent with air quality conformity horizon year thresholds, and projects have been identified as exempt and non-exempt based on current air quality conformity requirements.

Topography and Geology

Topography is defined as the general configuration of the earth's surface, including its slope, geological characteristics, and other natural features. Topography in this region of Tennessee is among the most varied in the United States. The MTPO region is located in the Ridge-and-Valley Appalachians, which is a physiographic province of the larger Appalachian Mountains extending from southeastern New York through northwestern New Jersey, westward into Pennsylvania and southward into Maryland, West Virginia, Virginia, Tennessee, North Carolina, Georgia, and Alabama.

These mountains are characterized by long, even ridges, with long, continuous valleys in between. From a great enough altitude, they almost look like corduroy, except that the widths of the valleys are somewhat variable and ridges sometimes meet in a vee. The ridge and valley system presents an important obstacle to east-west land travel even with today's technology. Elevations within the MTPO area range from 1,400 feet along the Watauga River to 4,280 feet on Holston Mountain. Slopes in the region range from below 5% to nearly 50%. In areas greater than 20% slope, limitations to development are severe.

Karst terrain makes up a large part of the northeastern Tennessee landscape and is very problematic in locating, designing, and constructing highways. Karst topography is the name given to an area underlain by rocks such as limestone and is characterized by

caves, sinkholes, and depressions. Figure 3-6 illustrates the regional context of karst development areas within the MTPO region.

Watersheds and Tributaries

As a result of the mountainous region, the drainage patterns in the Johnson City area are well developed. There are three watersheds that cover the MTPO area (the South Fork Holston River Watershed, the Watauga River Watershed, and the Nolichucky River Watershed) all of which are part of the Tennessee River Basin which is the largest tributary of the Ohio River system. In the 1800s, these waterways were used for transportation and commerce; however, today, in the MTPO area, none are navigable for freight transportation.

Within the MTPO area, the South Fork Holston River drains into the northern portion of Washington County which flows from Southwestern Virginia into East Tennessee. The Watauga River flows generally north and then west into Carter County where it forms the northern limits of Elizabethton, where the Watauga then receives the Doe River. A considerable portion of the boundary line between Washington County and Sullivan County is formed by the Watauga River. The Nolichucky River is a major stream draining the Blue Ridge Mountains of Western North Carolina and East Tennessee, as the river flows into the MTPO area through Unicoi and Washington counties toward Greeneville, Tennessee. Figure 3-7 illustrates the floodplains of these rivers and tributaries in the MTPO area. While these rivers, creeks and branches carry off most of the drainage, flooding in the MTPO area is common on the banks of the Watauga and Doe Rivers in Carter County and along the Brush Creek and King Creek basins in Washington County due to prolonged rainfall or backwater flooding. As the region develops and implements needed transportation improvements, it is important that transportation investments avoid or minimize impacts to these important watersheds and avoid flood prone areas.

Figure 3-6 Potential Karst Development Areas

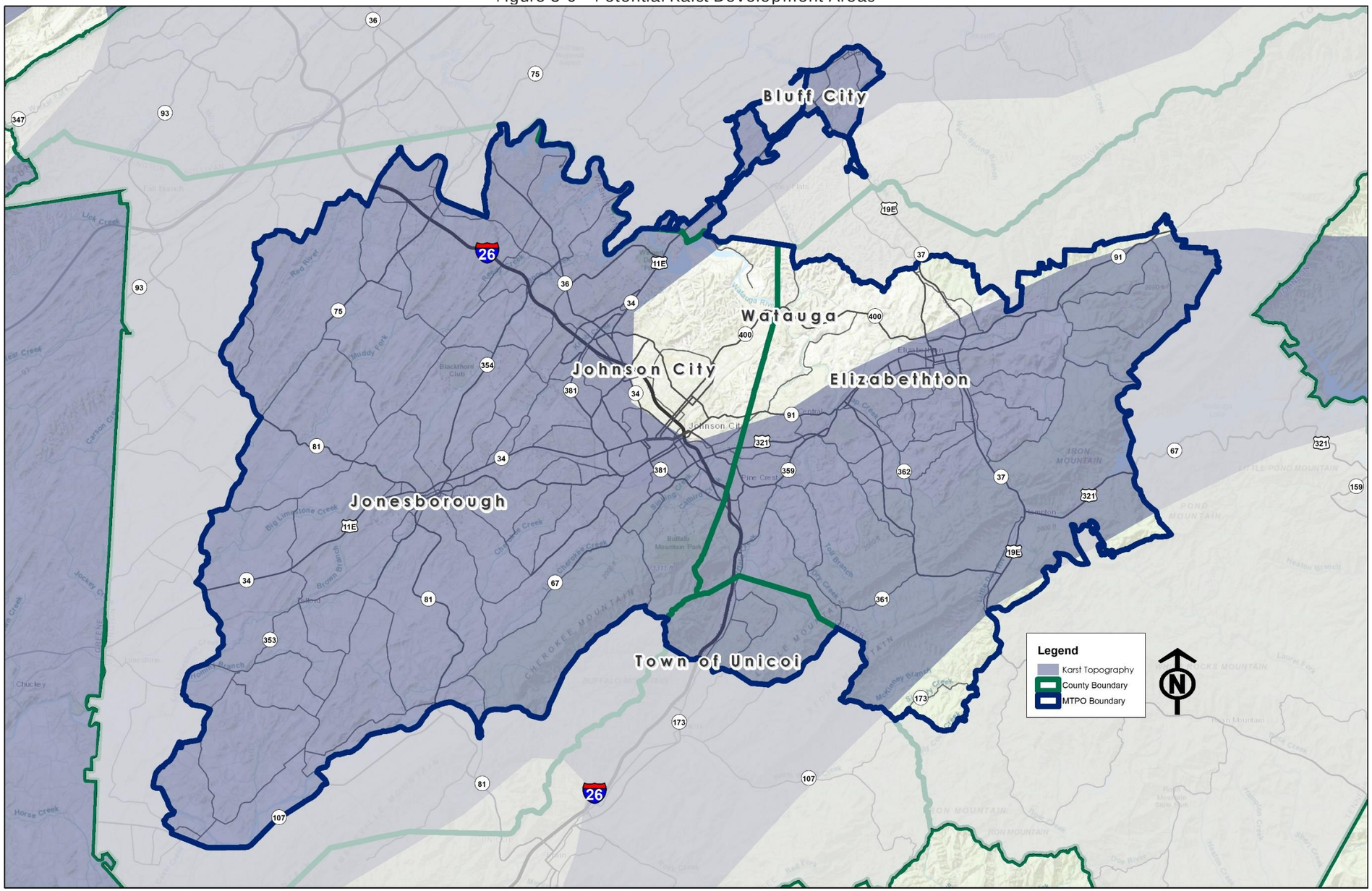
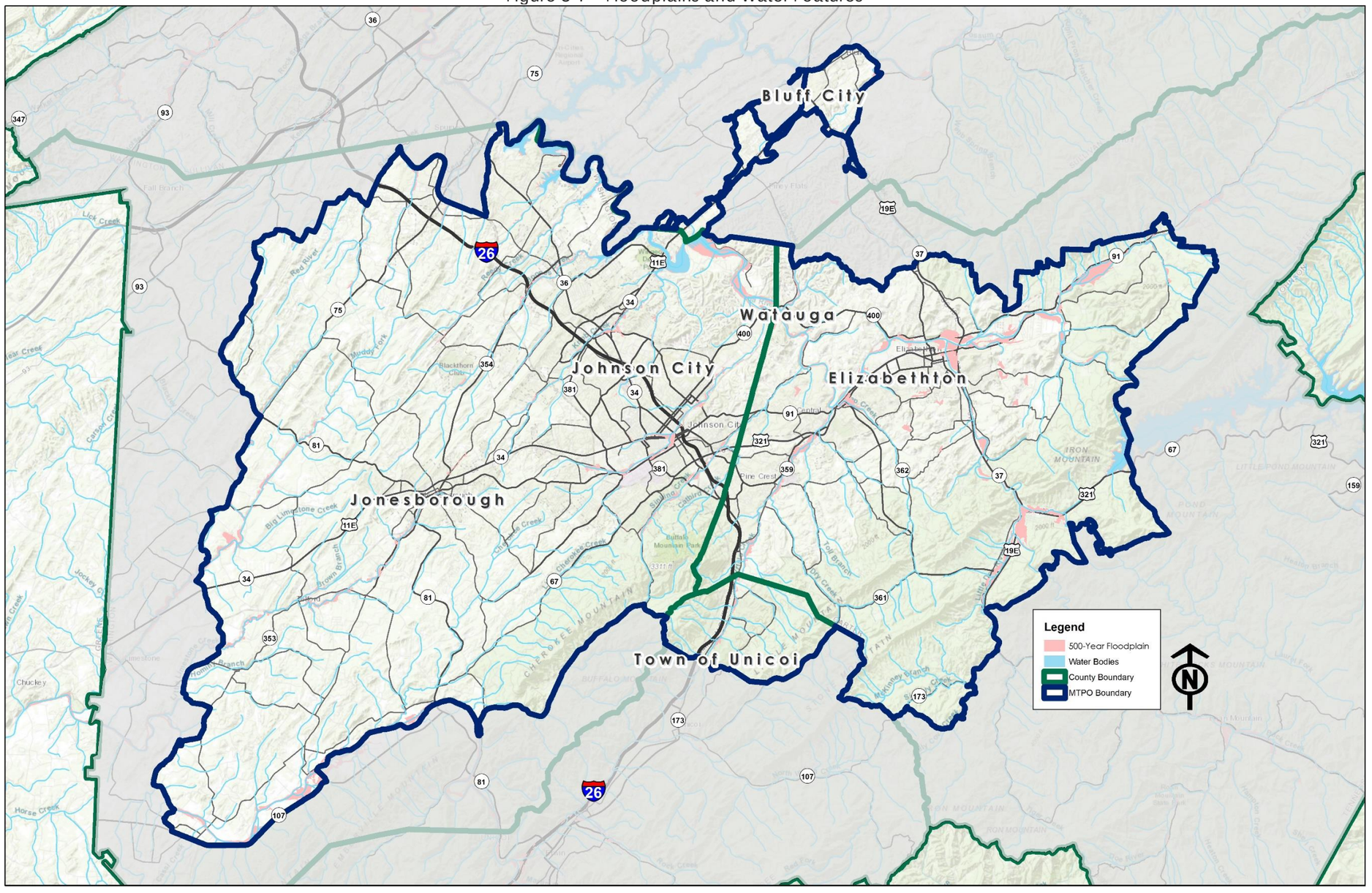


Figure 3-7 Floodplains and Water Features



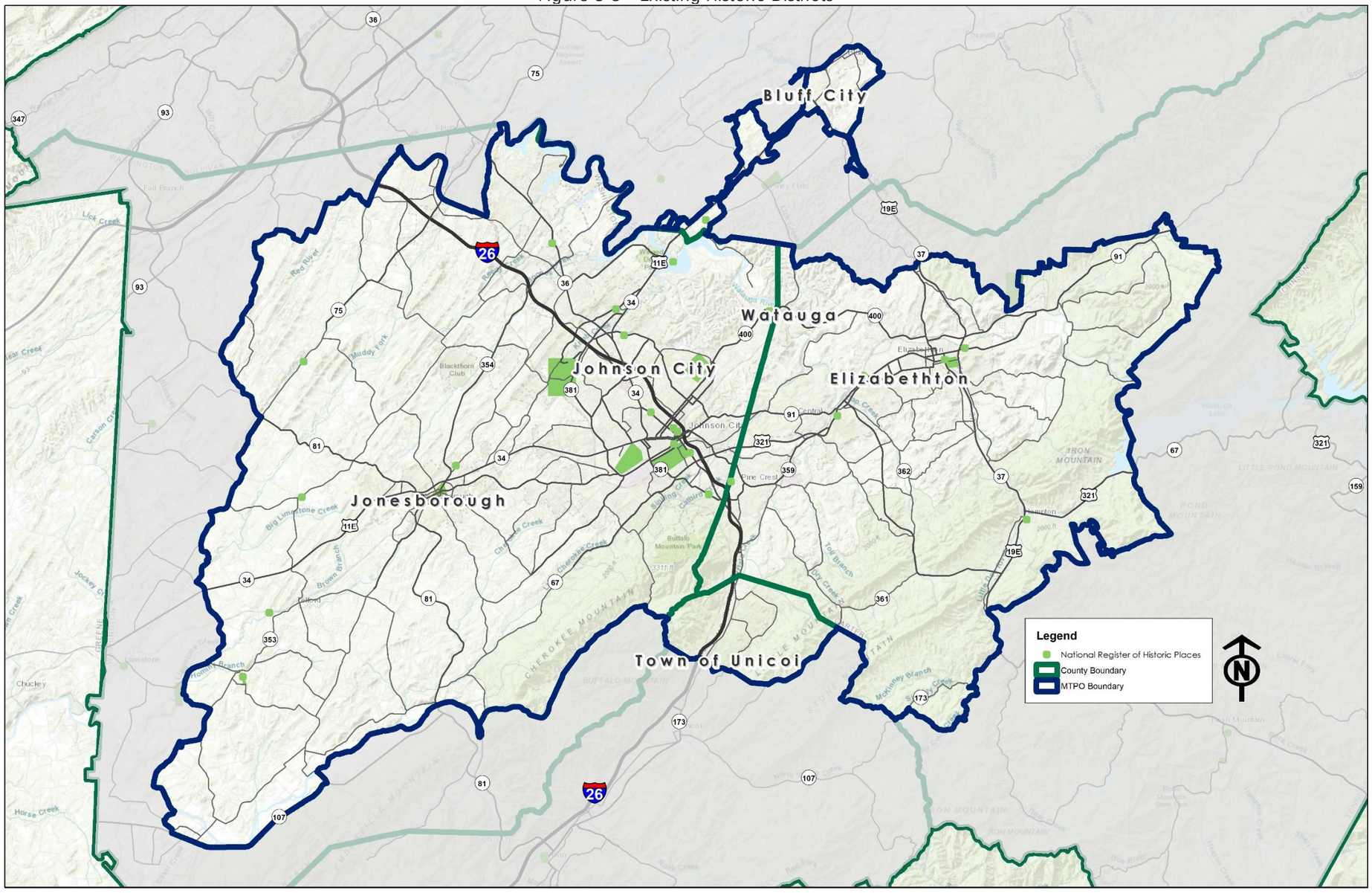
Historic and Cultural Environment

In addition to the natural environment, there is a cultural and historic environment in the Johnson City MTPO area with a long and rich history. The fascinating history of the area includes Cherokee Indians, early colonial pioneers, Revolutionary war heroes, Civil War battles, and beneficial government planning. This area of east Tennessee had been of strategic value since the railroad served as a vital link between the upper Confederacy of Virginia and the States of the lower south. The area is rich in history ranging as far back as 1673. Historic districts, homes, inns, churches, cemeteries, and living museums can be found within the MTPO planning area.

Figure 3-8 depicts the locations of these historic resources within the MTPO planning area.

Numerous laws and regulations call for preservation and/or enhancement of cultural resources through various local, state, and federal agencies. Historic preservation has become a major factor in the community and economic development of towns and cities throughout Tennessee. Historic preservation is now incorporated in many city and county planning efforts. As the Johnson City area grows and needed transportation facilities are planned, it is important that these improvements avoid and/or minimize impacts to these cultural resources. The MTPO through the development of the 2045 MTP and as part of the MTPO's planning process is committed to developing transportation improvements and solutions that exhibit context sensitive design and preserve/enhance environmental, scenic, aesthetic, historic, and natural resource values of these areas.

Figure 3-8 Existing Historic Districts



Land Use

Understanding land use and development activity is an important element when planning for transportation infrastructure and services. How a region grows or intends to grow has a direct impact on the type and level of investments a community must make to its transportation system.

The Tri-Cities region has a long history of planning dating back to early 1900s with the creation of a General Plan for the City of Johnson City in 1927 by the renowned city planner and landscape architect John Nolen who is also credited with creating the General Plan for the City of Kingsport in 1919. Nolen's accomplishments as a city planner are quite impressive. He was the head landscape architect for not only Johnson City and the City of Kingsport, but other successful American cities like Madison, Wisconsin; Roanoke, Virginia; San Diego, California; New London, Connecticut; and Savannah, Georgia. Nolen integrated ideas such as roundabouts, which were common around his home in Massachusetts. Areas for commerce and industry were set up and strategically outlined among the residential areas. The school system was set up based on a model developed at Columbia University.

Today, much of Johnson City's urban core continues to embrace this design while outlying portions of the region are more typical of post-World War II development, suburban in nature and highly auto-oriented. Despite this development trend, the region has attempted to direct growth into areas that are most suitable for development and to a degree contiguous to existing corporate limits as a means of cost effectively providing city services. Additionally, the region has successfully maintained a large portion of its planning area as rural in character and with a large portion of the planning area being the Cherokee National Forest, development has been limited to areas of the region more suitable for development.

Figure 3-9 illustrates the current land use within the MTPO area. The largest share of land in the MTPO area (49%) is classified as agricultural, which includes large rural tracts of land that are intended to remain rural in nature, farm and forest lands. The second largest classification of lands (37%) is residential lands. Other existing land uses within the MTPO planning area include public lands (e.g. city, county, state, and federal), commercial activity, which is largely clustered in the downtown areas of Johnson City, Elizabethton, and Jonesborough and along major corridors such as SR 34 (North Roan Street/West Market Street), SR 381 (North State of Franklin Road), and SR 67 (Elk Street), and industrial uses that are located east of downtown Johnson City (off of SR 400), along SR 91 in Carter County – east of downtown Elizabethton, and other areas of the region including SR 75 (Bobby Hicks Highway) near I-26.

Growth Boundaries

Public Chapter 1101 (T.C.A. § 6-58-106) requires Tennessee's counties and their municipal governments to develop countywide growth plans. Public Chapter 1101 signaled a substantial change in the way growth planning, annexation, and incorporation could be accomplished by counties and municipalities within Tennessee. Public Chapter 1101

requires local officials within each of the 93 non-metropolitan counties to work together to shape growth policy through the development of 20-year growth plans.

Each plan must identify three distinct areas: an "urban growth boundary," a "planned growth area" and a "rural area." The "urban growth boundary" (UGB) territory contains the corporate limits of a municipality and the adjoining territory where growth is expected. The "planned growth area" (PGA) includes sections outside current municipalities and UGBs where growth is expected. The "rural area" (RA) includes land that is to be preserved for agriculture, recreation, forest, wildlife and uses other than high-density commercial or residential development.

Figure 3-10 provides the approved Growth Boundary Map within the MTPO region. Of the MTPO's planning area, approximately 51% is contained within a UGB. As illustrated on the map, areas outside the UGB contain some PGAs but for the most part are intended to remain rural areas, to be preserved for agriculture, recreation, forest, wildlife, or uses other than high-density commercial or residential development.

Land Suitability

To further understand growth and development patterns and opportunities within the MTPO area an assessment of land coverage data from the United States Geological Survey (USGS) was undertaken. The National Land Cover Database provides a rich understanding of land cover allowing for an assessment of developed lands, suitable lands, and less suitable lands. Figure 3-11 illustrates within the MTPO area that are more conducive to development and areas within the region which are limiting and/or restricted given physical land characteristics. It should be noted that even though an area may be designated as suitable on this map, it may not have the surrounding infrastructure necessary to support development. This data along with other variables, such as existing and future land use policies and urban growth boundary plans were used to develop future year population and employment allocations within the region.

Figure 3-9 Existing Land Use

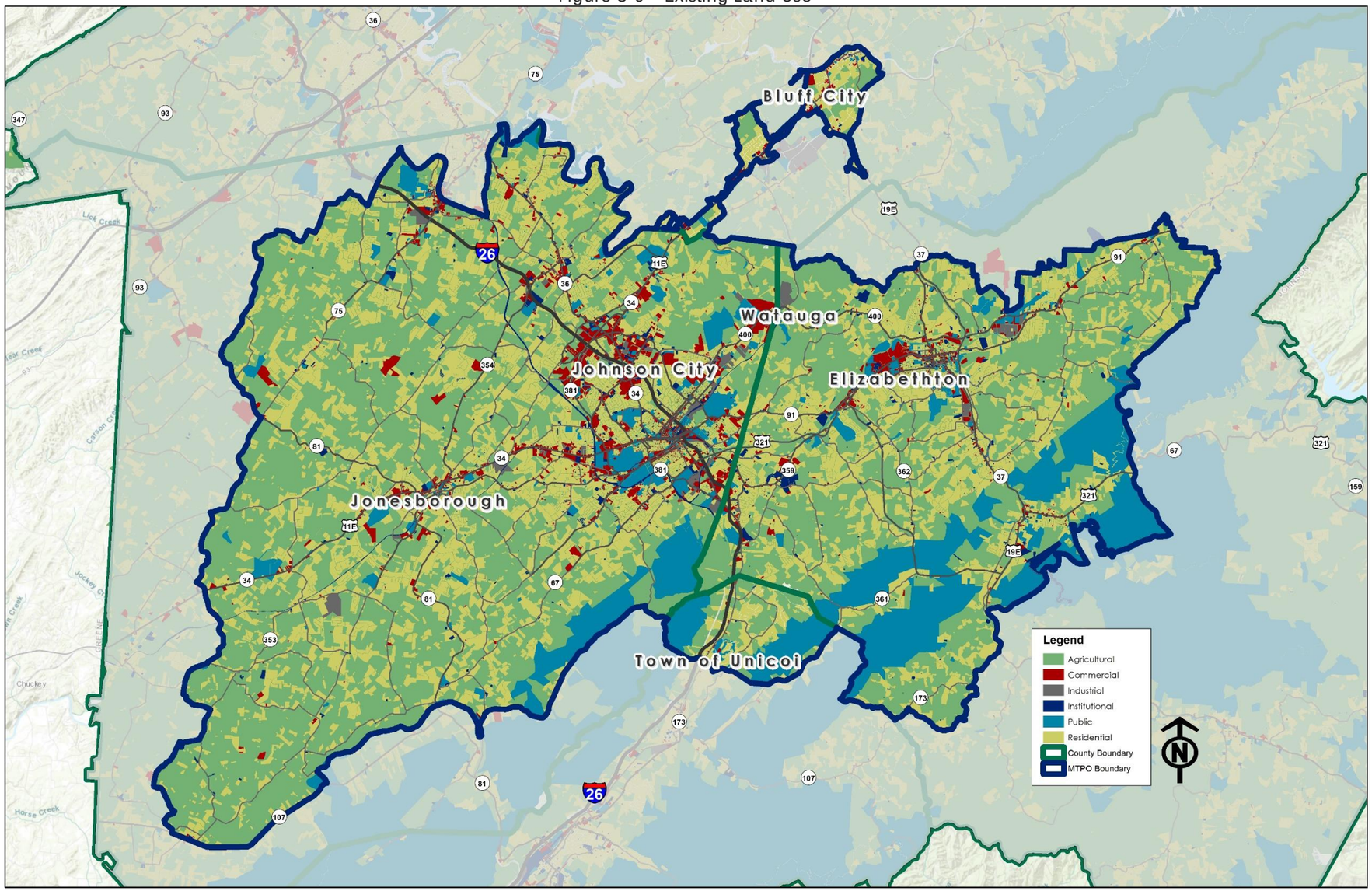


Figure 3-10 MTPO Urban and Planned Growth Boundaries

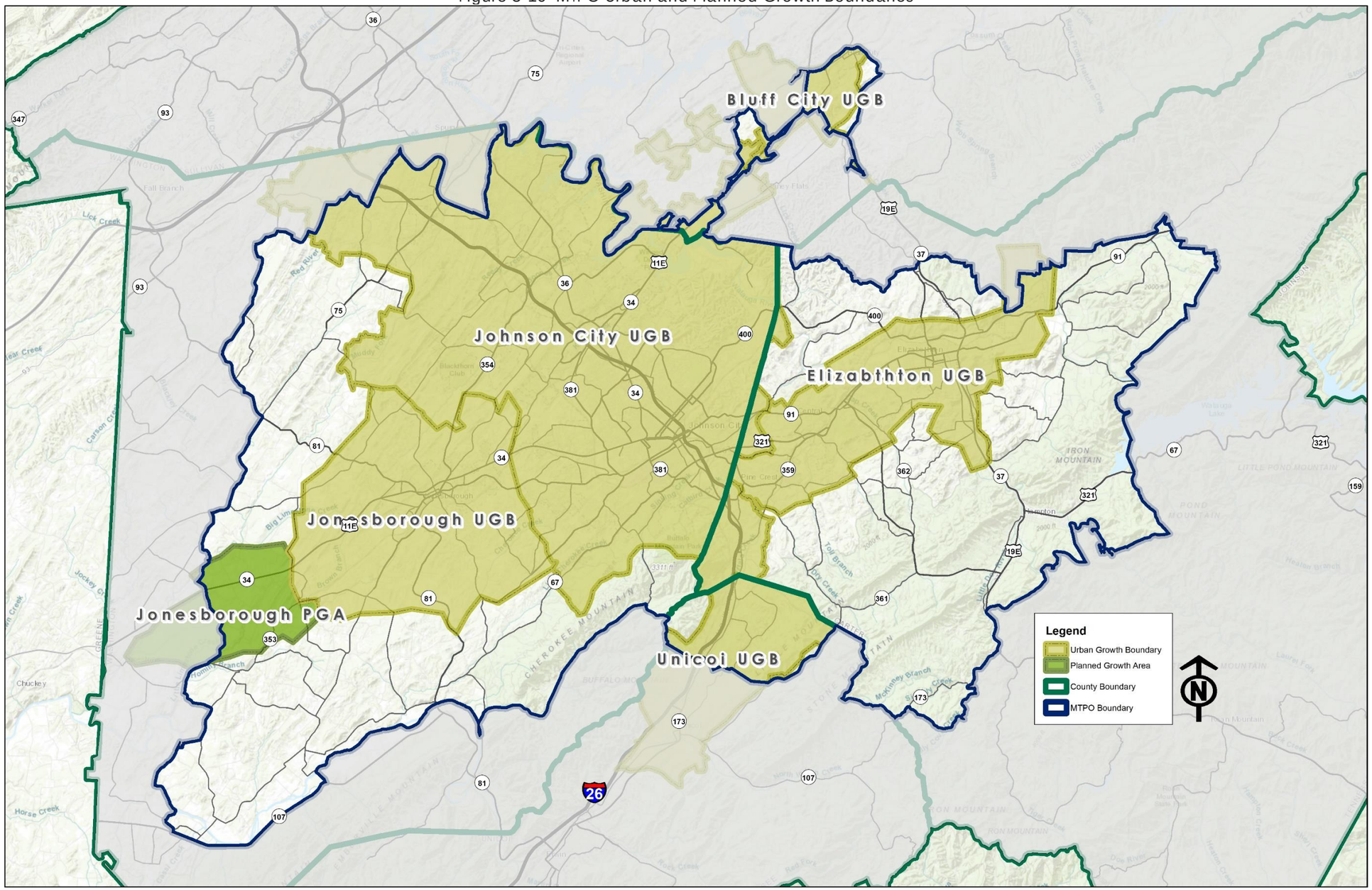
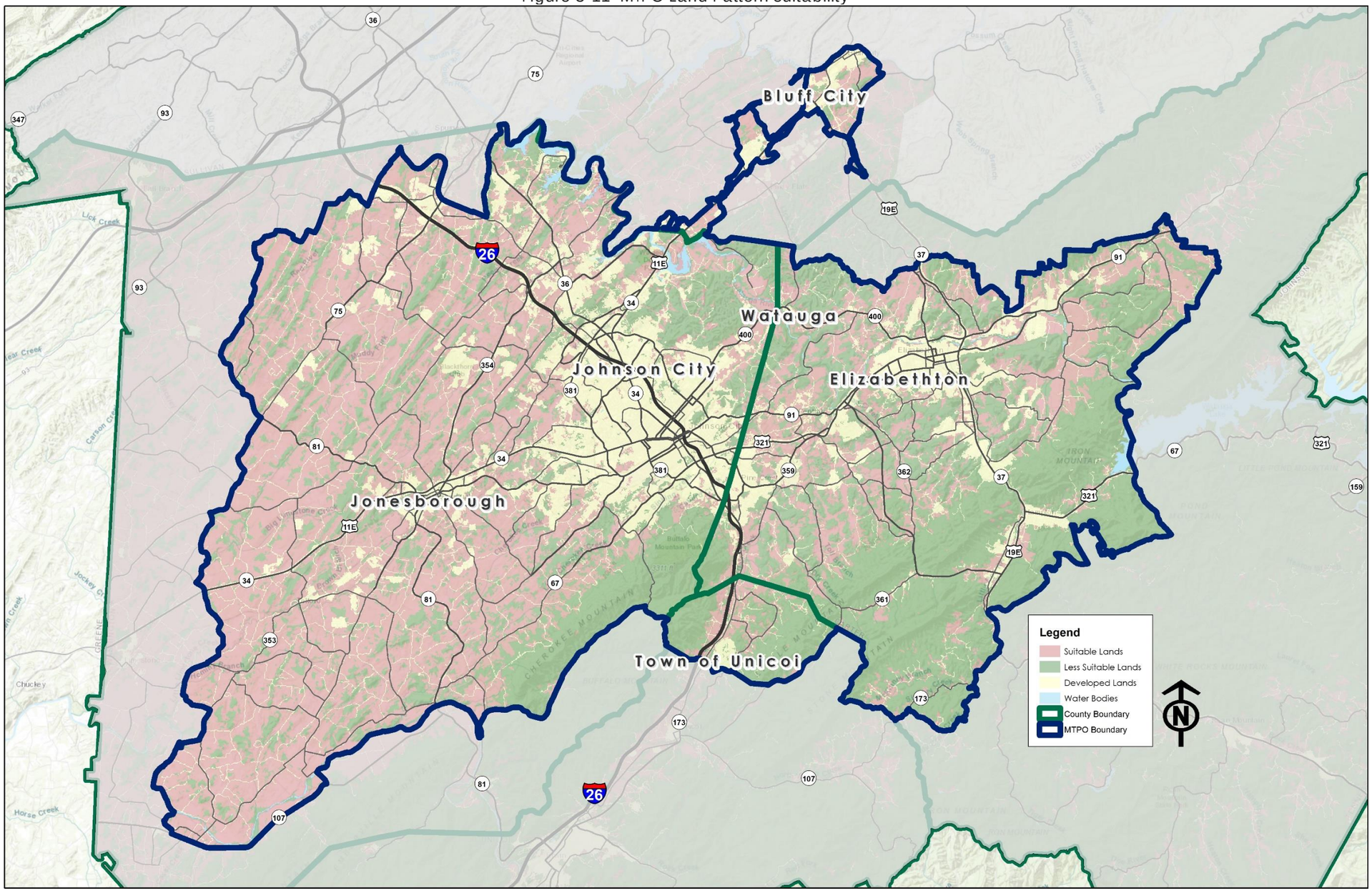


Figure 3-11 MTPO Land Pattern Suitability



3.5 PLANS, PROGRAMS, AND POLICIES

In addition to land use and growth boundary plans, there are a number of other local, state, and regional plans, programs, and policies that dictate growth and development within a community. In developing the 2045 MTP, the following plans, programs, and policies were reviewed and incorporated into the analysis and recommendations of the 2045 MTP. These documents were used in establishing future year development allocations (e.g. the allocation of future year population and employment) and are reflected in the growth trends for the region over the plan horizon.

City and county governments have direct jurisdiction over land use and growth decisions within their communities. The following are other planning items that were reviewed and considered in the development of the 2045 MTP:

Town of Jonesborough, TN

- Jonesborough Economic Development and Transportation Study (2008)

City of Johnson City, TN

- Johnson City Major Street and Road Plan (2006)
- Johnson City Comprehensive Plan 2020 (2008)
- Johnson City MTPO Rail Trail Master Plan (2013)
- Johnson City Transit System Plans
- Johnson City Citizen Survey (2016)
- Johnson City Housing Demand Study (2015)
- Johnson City Walkability and Health Study (2016)

Washington County, TN

- Washington County Thoroughfare Plan (2015)
- Knob Creek Road Land Use Forecast (2015)
- Washington County Hazard Mitigation Plan (2010)

City of Elizabethton, TN

- Elizabethton Land Use and Transportation Study (2011)

Carter County, TN

- Hazard Mitigation Plan (2006)

Unicoi County, TN

- Unicoi County Land Use and Transportation Plan (2008)

State and regional plans, programs, and policies can also and do also influence growth and development activities locally, regionally, and statewide. The following national, state, and regional initiatives were reviewed:

US Department of Agriculture Forest Service Southern Region

- Cherokee National Forest Revised Land and Resource Management Plan (2004)

Appalachian Regional Commission (TN)

- Moving Appalachia Forward Appalachian Regional Commission Strategic Plan 2011–2016 (2015)

Tennessee Department of Economic and Community Development (TN)

- Northeast Tennessee Regional Strategic Plan (2011)

Tennessee Department of Transportation

- Tennessee's Long-Range Statewide Transportation Plans
- Tennessee's State Transportation Improvement Program
- Tennessee's Strategic Highway Safety Plans
- Tennessee's Statewide Multimodal Freight Plan
- TDOT Title VI Compliance and Implementation Plan
- TDOT I-40/I-81 Corridor Feasibility Study
- TDOT Transportation Planning Reports (TPRs) and Interchange Modification/Access Studies

3.6 SUMMARY

Development of the 2045 MTP is based on the existing and future land use policies and plans, as described within this document. Plans, policies, and anticipated growth areas within the region were considered in the development of the future population and employment forecasts for the MTPO region. As part of this effort, close coordination with local and regional planning agencies within the Johnson City region was undertaken to best match anticipated development activities within the MTPO area in the coming years.

As previously described, the MTPO area has seen and is projected to see positive population and employment growth over the planning horizon. Population and housing growth is planned to occur largely within the designated UGB with both infill and outward residential expansion. Areas outside the UGB will see some residential growth but at a much lower level. As for projected employment growth, a large number of these jobs are planned to occur in and around the same geographic areas of current employment activity. In addition to these locations, future employment concentrations are planned along the I-26 corridor throughout Washington County at the interchanges of SR 75 (Bobby Hicks Highway), SR 354 (Boones Creek Road), and SR 381 (State of Franklin Road) as well as near the Knob Creek corridor. Other employment growth areas include the SR 67 corridor (Elk Avenue) and along SR 91 in Elizabethton.

This projected increase in population and employment will not only require the need for additional roadway capacity (both in terms of new roads and improvements to existing roads), but will also create greater demand for public transportation services and walking and biking opportunities, which may not currently exist in certain areas of the region. An equally important challenge during the planning horizon is how to encourage development and growth that balances the need for expansion with the need for preservation.

Additionally, the impacts of the upcoming 2020 U.S. Census could potentially have significant impacts on the Johnson City and surrounding Tri-Cities area. Of specific interest is the potential merging of urbanized areas for Kingsport, Bristol, and Johnson City. Should this be an outcome of the next Census, thought will need to be given to the future of the three existing MPOs in the region and the organizational, political, and funding changes that could potentially ensue with a single urbanized area for the Tri-Cities.

4 MULTIMODAL TRANSPORTATION SYSTEM AND PERFORMANCE

This section of the plan provides an assessment of the existing and future transportation system conditions within the MTPO planning area. As part of this assessment, future transportation system needs are discussed.

The Johnson City MTPO area transportation system includes various elements - streets and highways, public transportation, walkways and bikeways, airports, and railroads. All of these transportation elements comprise the transportation system within the MTPO area and provide for the movement of people and goods.

The following subsections describe each component of the transportation system relative to existing and future conditions.

4.1 ROADWAY NETWORK

Existing and Planned System

The roadway network in the Johnson City MTPO area consists of several classifications of roadways. The majority of roadways within the MTPO area, as with most metropolitan areas, are classified as local roads. Local roads include those roadways that are typically low-volume roadways that provide direct frontage to residential developments. There are over 1,100 miles of local roads within the MTPO area.

Interstates and expressways are full-access controlled roadways that carry the majority of through-traffic volumes entering and exiting an urban area. Expressways, to a degree, also facilitate major cross-town uninterrupted travel movements in urban areas. In the Johnson City MTPO area there is one roadway classified as interstate, I-26; I-81 is outside of the Johnson City MTPO area, but still has an impact. Both of these corridors account for the largest amount of through-travel within the region. These corridors are important corridors of commerce providing commuters, shippers, and travelers access to and from the region as well as throughout the US. New Elizabethton Highway (SR 67/US 321) is an expressway that is access controlled between I-26 and Milligan Highway (SR 359) providing about a 4-mile stretch of uninterrupted traffic flow between Johnson City and Elizabethton.

Principal arterials are roadways that serve major activity centers, such as downtown Johnson City or highly developed residential and commercial areas. Principal arterials generally carry high traffic volumes and accommodate the longest trip length desires of the region. Principal arterials also carry high traffic volumes into and out of the urban area. Examples of principal arterial roadways in the MTPO area include West Market Street (US 11E), State of Franklin Road (SR 381), and Bristol Highway (US 11E).

Minor arterials interconnect with principal arterials and collectors and typically provide more frequent access to commercial developments than principal arterials allow. Minor arterials typically do not accommodate traffic volumes as high as those experienced on

principal arterials. In the MTPO area, examples of minor arterials include Roan Street (US 11E), Boones Creek Road (SR 354), and Bobby Hicks Highway (SR 75).

Collector roadways provide both land access and circulation within residential neighborhoods and commercial or industrial areas. Collectors typically function to connect neighborhoods and local roads with the arterial roadway network. Collector roadways generally carry lower traffic volumes and accommodate shorter trip lengths than arterials.

Figure 4-1 illustrates the roadway functional classification for the MTPO area, including collector roadways and higher classifications. Table 4-1 summarizes the total miles of these classified roadways by functional classification.

Table 4-1 Existing Miles of Classified Roadways (2015)

Roadway Functional Classification	Total Miles
Interstate & Expressway	19
Principal Arterial	70
Minor Arterial	132
Collector	296
Local	1,111
Total Miles	1,628

Source: TDOT TRIMS Network

Figure 4-2 illustrates the Average Daily Traffic (ADT) volumes of roadways in the MTPO area with ADT counts over 10,000 vehicles per day in 2016 based on data collected by the Tennessee Department of Transportation (TDOT). Roadway travel within the MTPO area is greatest along major roadways such as I-26, State of Franklin Road (SR 381), US 231/ SR 67 in Elizabethton and Carter County, and West Market Street (US 11E/ SR 34).

Figure 4-1 Roadway Functional Classification

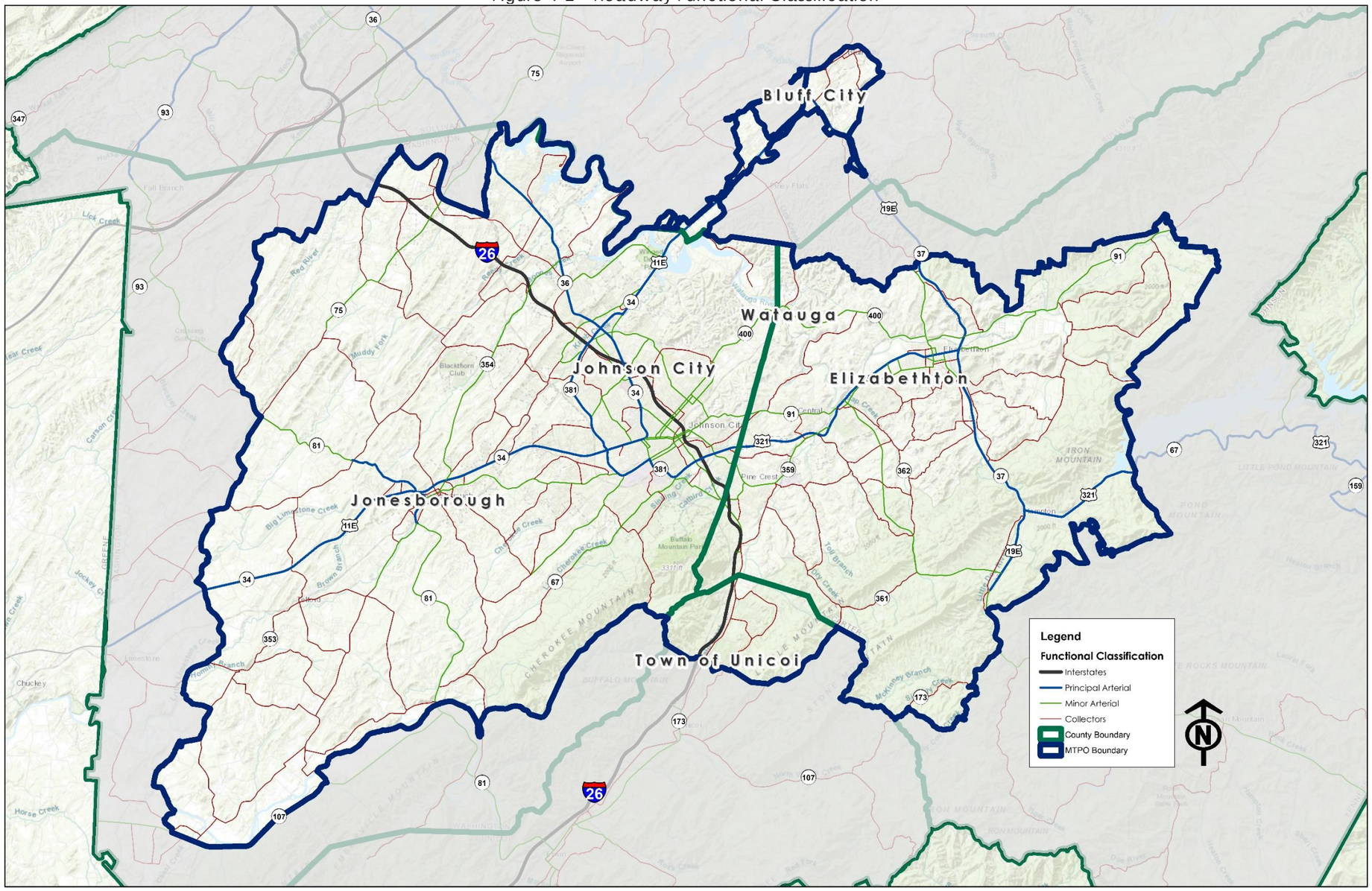
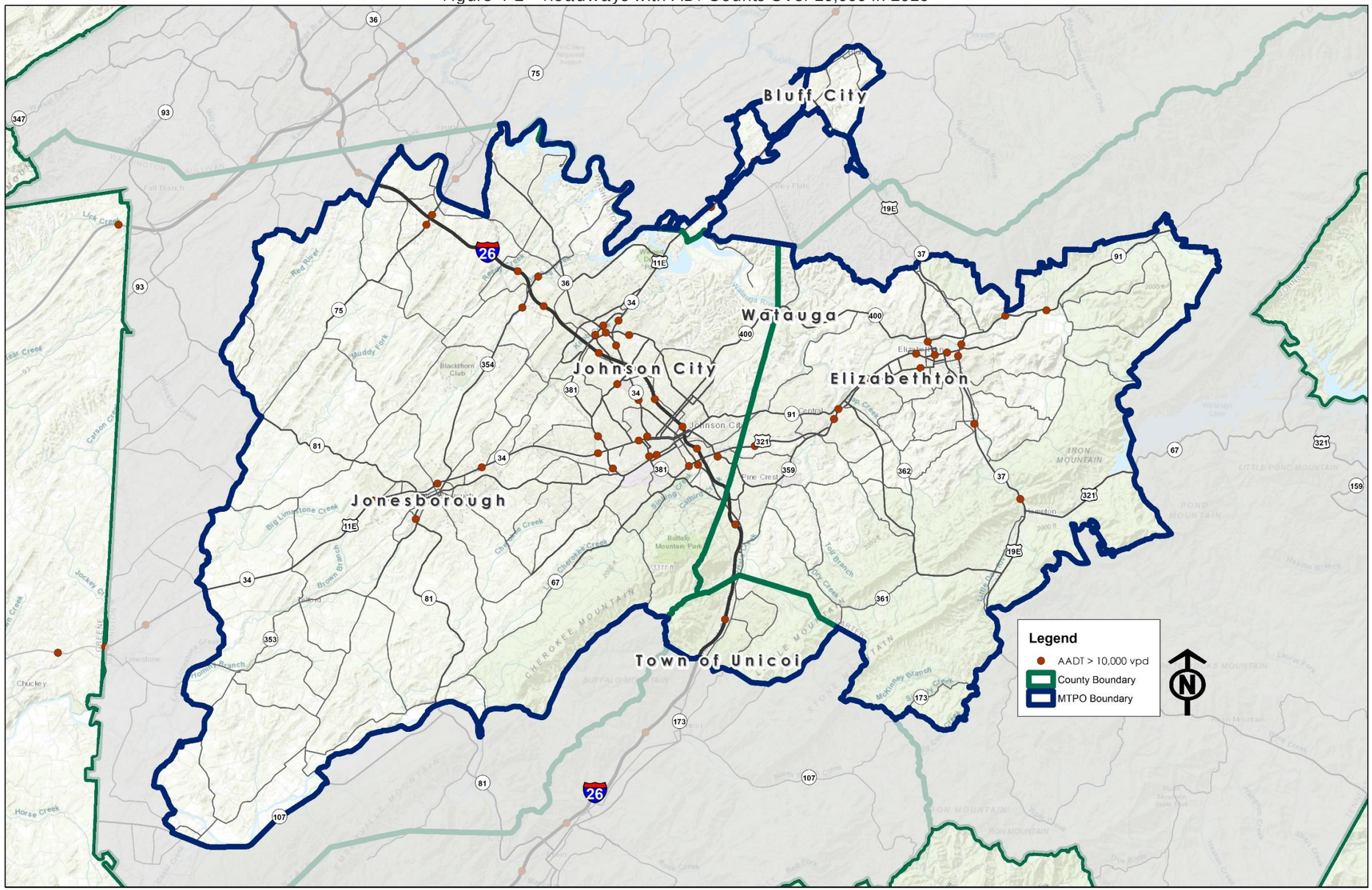


Figure 4-2 Roadways with ADT Counts Over 10,000 in 2016



The MTPO region has made considerable progress since 2013 in advancing needed transportation improvements. In total, 28 transportation roadway projects have been completed, are under construction, or are in the development process. Table 4-2 illustrates the projects that have been completed since the last plan and those projects that are considered committed projects.

A common practice in looking at long-term transportation demands is to assess future transportation needs based on impacts to the transportation system if no more improvements were made beyond current roadway facilities and those projects that are currently committed to be improved. In undertaking this assessment, committed improvements are added to the existing transportation network of the MTPO's travel demand model - which is termed an existing plus committed (E+C) network. The E+C network provides the "base roadway network" and allows for the assessment of travel impact, today and in the future, under a "no additional transportation improvement scenario". For planning purposes, committed projects on the E+C network are those projects that are currently funded in the MTPO's *Fiscal Year 2017-2020 TIP* and TDOT's *Fiscal Year 2017-2020 STIP*. It should be noted that an * denotes projects that have funding identified through Tennessee's IMPROVE Act, detailed later in Section 5.1.

Table 4-2 Projects Completed Since 2013 & Committed Improvements (E+C Network)

Project/Route	From/To	Type of Improvement	Improvement Description	Funding Status	Project Status
Kingsport Hwy (SR 36)	SR 354 (Boone Avenue) to SR 75	Widening	Widen from 2 lanes to 5 lanes	Complete	Complete
Gap Creek Road (SR 362)	SR 67 to SR 361	Reconstruction	Reconstruct & Widen - 2 and 3 lanes	Complete	Complete
SR 75	SR 36 to SR 357	Widening	Widen from 2 lanes to 5 lanes	Complete	Complete
Traffic Signal Upgrades in Johnson City	Intersection/Signalization improvements at 10 locations in Johnson City	Intersection Improvement	Install traffic signals	Complete	Complete
Johnson City ITS Project (formerly IVHS)	Select State Routes in Johnson City	ITS	Install ITS (sensors, TOC, etc.) for Johnson City Traffic Division	Complete	Complete
I-26 Exit 13 (SR 75)	Exit 13 on I-26 (SR 75/ Suncrest Drive/ Bobby Hicks Highway @ I-26)	Interchange Improvement	Interchange modification	Complete	Complete
SR 91 and SR 67 Signals	Judge Ben Allen Road @ SR 91; SR 67 @ Williams Avenue in Elizabethton	Intersection Improvement	Install new traffic signals at intersections in Elizabethton	Complete	Complete
VA Hospital Connector	West Market Street to VA Hospital	New Roadway	Construct new 2-lane road	Complete	Complete
SR 81 & SR 353 (Jonesborough Five Points Intersection)	Intersection of SR 81 with SR 353 with Depot Street in Jonesborough	Intersection Improvement	Construct a roundabout	Complete	Complete
Traffic Circle for Mountainview Road	Intersection of Mountainview Road and Browns Mill Road	Intersection Improvement	Construct a roundabout	Complete	Complete
SR 381	Intersection with Indian Ridge Road and Skyline Drive	Intersection Improvement	Add turn lanes, bridge rehabilitation	Funded thru CONST	Under CONST
I-26 Exit 24 (SR 67)	Exit 24 on I-26 (SR 67/ University Parkway @ I-26)	Interchange Improvement	Ramp Modification	Funded thru CONST	Under CONST
Knob Creek Road Extension	West of Mizpah Hills Drive to Marketplace Boulevard	Reconstruction	Construct a new 5 lane (overpass crossing CSX RR)	Funded thru ROW in 2016	Under Development
SR 91 Extension (formerly Elizabethton Connector)*	Near SR 67 (US 321) to near SR 37 (US 19E)	Reconstruction	Resurface and restripe existing 5-lane, reconstruct 4-lane to 5-lane, add curb and gutter section, add sidewalk section, reconfigure intersection of N. Roan St. and E. Elk Ave.	Funded for ROW in 2018	Under Development
I-26 Exit 17 (SR 354)*	Exit 17 on I-26 (SR 354/ Boones Creek Road @ I-26)	Interchange Improvement	Interchange modification	Funded thru ROW. ROW to start in spring 2017	Under Development
Greenline Road	Intersection of Peoples Street and Greenline Road	Intersection Improvement	Intersection Improvement	Funded for PE in 2020	Not Started
Adaptive Signal Control - Phase 1	SR 381 (North State of Franklin Road) from Knob Creek Road to Browns Mill Road	ITS	Add adaptive signal control on North State of Franklin Road in the vicinity of I-26 to improve safety and reduce congestion.	Funded for PE, CONST in 2019	Not Started
Adaptive Signal Control - Phase 2	Systemwide deployment throughout Johnson City	ITS	Deployment of real-time adaptive signal control technologies	Funded for PE, CONST in 2019	Not Started
Elk River Bridge Repair	Elk Avenue Bridge over Doe River	Bridge Rehabilitation	Repair and rehab the bridge due to deterioration	Funded for PE 2017, CONST in 2018	Under Development
Signalization Improvements for Elizabethton at Two Intersections	SR067 (Elk Ave) and Milligan Hwy/ SR067 (Elk Ave) and Mill St	Intersection Improvement	Upgrade and install traffic signals	Funding for PE, CONST in 2017	Under Development
SR 34 at Industrial Park Road Traffic Signal Upgrade	Intersection of SR 34 (US 11E/19W) at Industrial Park Road	Intersection Improvement	Upgrade traffic signals	Funded thru PE, CONST in 2017	Under Development
Traffic Signal for State of Franklin Road and Harris Drive	Intersection of SR 381 (State of Franklin Road) and Harris Drive	Intersection Improvement	Install traffic signals	Funded for PE, CONST in 2017	Under Development
Traffic Signal Upgrades at various locations in Elizabethton	Intersection/Signalization improvements at various intersections in Elizabethton	Intersection Improvement	Upgrade and install traffic signals at various intersections to improve safety and congestion	Funded for PE, CONST in 2018	Not Started
SR 34 at SR 354 in Jonesborough	Intersection of SR 34 (US 11E) and SR 354 (Boones Creek Road)	Intersection Improvement	Intersection Improvement	Funded thru CONST in 2017	Under CONST
SR 34 Improvements	SR 34 (US 11E) from Jonesborough City Limits to Claude Simmons Road	Reconstruction	Install turn lanes	Funded thru CONST in 2017	Under CONST
Traffic Signal for SR 36 at Mountainview Road	SR 36 (North Roan Street) at Mountainview Road	Intersection Improvement	Install traffic signals	Funded thru CONST in 2017	Not Started
SR 81 at Persimmon Ridge Road Improvements	SR 81 (West Main Street) at Persimmon Ridge Road	Intersection Improvement	Intersection Improvement	Funded thru ROW	Under Development
SR 354 and Bugaboo Springs Road Improvements	SR 354 (Boones Creek Road) at Bugaboo Springs Road	Intersection Improvement	Intersection Improvement	Funded thru ROW	Under Development

Roadway Operations

One of the tools that the JCMTPO uses to identify future roadway needs is the travel demand model. The computer-based model uses the population and employment figures from Chapter 3 to predict the level of demand on various roadways. Congestion is identified at locations where the anticipated demand exceeds the available roadway capacity. For this MTP, future levels of congestion were modeled to the year 2045.

The travel demand model uses the following 4-step process:

- Trip Generation: Total trips generated by persons that start and end in each traffic analysis zone (TAZ) are predicted, based on the population, employment, household characteristics, etc., of the TAZ. A TAZ is an area defined by land use, physical barriers to travel, and natural features for modeling purposes.
- Trip Distribution: The trips are distributed among pairs of TAZs, based on a model which distributes trips based on inverse proportion to the distance between TAZs (the model assumes a traveler will use the route that represents the shortest possible distance and travel time).
- Mode Choice: The trips are allocated among the available travel modes, such as automobile, transit, and non-motorized such as bicycling or walking, based on relative characteristics (usually time and cost) of the modes.
- Network Assignment: The trips are generated to specific links (road segments) in the transportation network, generally based on the shortest time path between the two TAZs.

Traffic volume data derived from the MTPO's travel demand model outputs, along with roadway characteristics such as number of lanes, facility type, etc., helps in defining traffic operations or level of service (LOS) conditions along a roadway. The transportation industry categorizes LOS into one of six traffic operation conditions, as illustrated in Table 4-3.

Table 4-3 General Descriptions of Levels of Service (LOS)

Level of Service	Description
A	Represents free flow. Individual users are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to maneuver within the traffic stream is extremely high.
B	Within the range of stable flow, but the presence of others in the traffic stream begins to be noticeable. Freedom to select desired speeds is relatively unaffected, but there is a slight decline in the freedom to maneuver within the traffic stream from LOS A.
C	Within the range of stable flow, but LOS C marks the beginning of the range of flow in which the operation of individual users becomes significantly affected by interactions with others in the traffic stream.
D	LOS D represents high-density, but stable flow. Speed and freedom to maneuver are severely restricted, and the driver experiences a generally poor level of comfort and convenience.
E	LOS E represents operating conditions at or near capacity levels. Freedom to maneuver within the traffic stream is extremely difficult. Comfort and convenience levels are extremely poor and driver frustration is generally high.
F	LOS F is used to define forced or breakdown flow. This condition exists when the amount of traffic approaching a point exceeds the amount that can traverse the point.

Source: Highway Capacity Manual, TRB 2010

Average Daily Traffic (ADT) is the total number of vehicle trips on a roadway in a 24-hour period. Based on the ADT, number of lanes, and classification of the roadway, a LOS is assigned to the roadway segment. Figure 4-3 illustrates the existing LOS of roadways within the MTPO area for the base year of 2015. Figure 4-4 illustrates the future level of service of the MTPO area roadways in 2045, assuming no additional improvements to the transportation system beyond the E+C network (as described in Table 4-2).

The level of service capacity analysis of the existing plus committed transportation system shows that transportation improvements, beyond those already committed, will be necessary to provide acceptable traffic operations for the year 2045. As shown in Figure 4-4, a number of roadways within the MTPO region are expected to experience severe capacity deficiencies in the year 2045, should no additional roadway projects be constructed beyond those currently under construction and/or in the development process.

From a systems level, with projected increases in population and employment in the region by 2045, the vehicle hours traveled (VHT) on the roadway system in 2045 would increase by nearly 55% if the region were to construct no additional transportation improvements over those currently committed (the E+C network). VHT represents the time

spent by drivers in their vehicles. Table 4-4 illustrates the VHT in the region currently, versus 2045 conditions were the region to add no more lanes or roadways over the planning horizon beyond what is currently under construction and/or in the development process.

Table 4-4 Current & Future Vehicle Hours Traveled Without Additional Improvements

Roadways	2015 (Base Year)	2045 (E+C)	Percent Change
Interstate	29,524	64,670	119%
Principal Arterial	38,475	48,619	26%
Minor Arterial	31,662	43,241	37%
Collector	21,660	29,949	38%
Total VHT	121,321	186,479	54%

Figure 4-3 2015 Level of Service

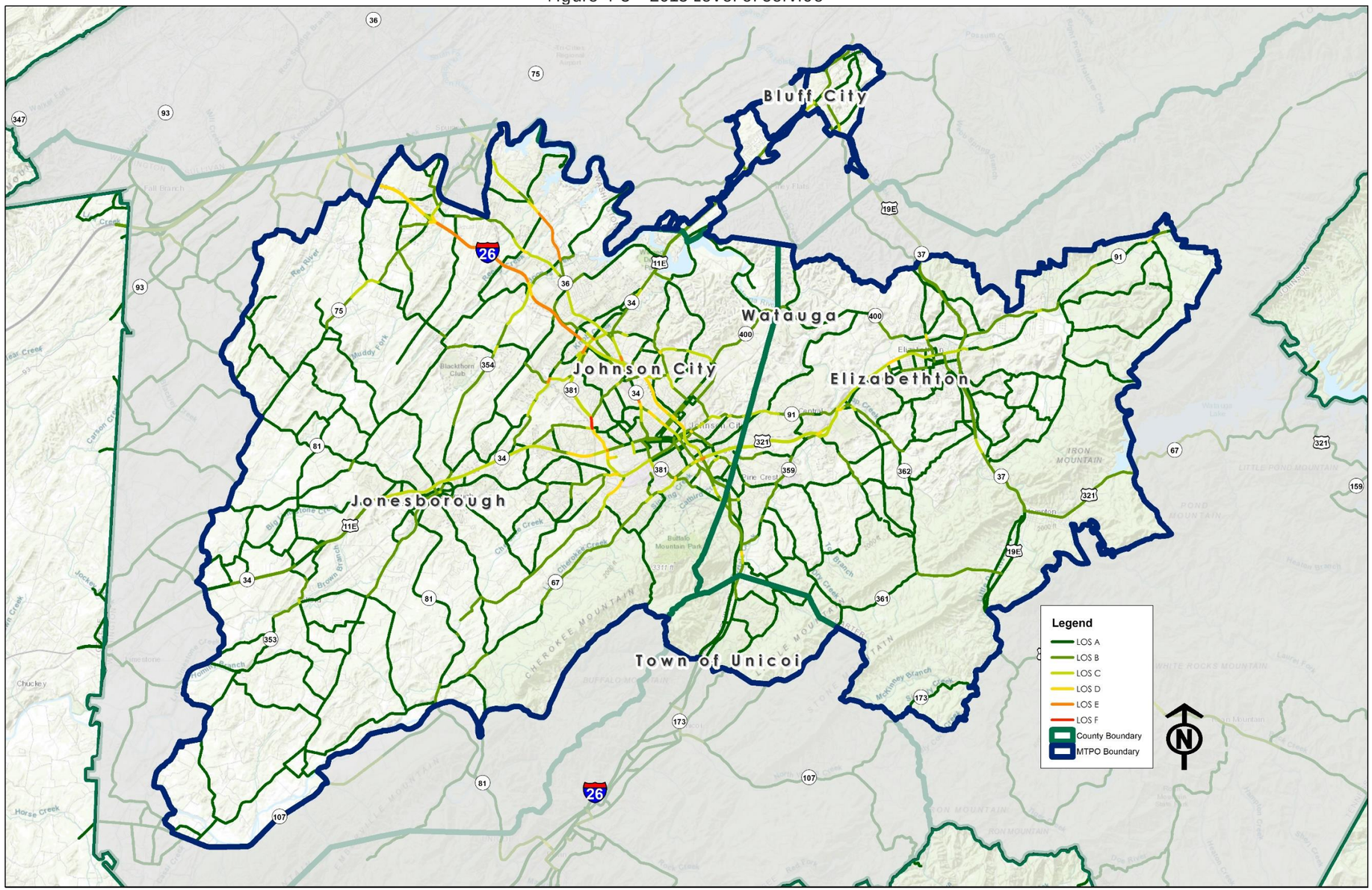
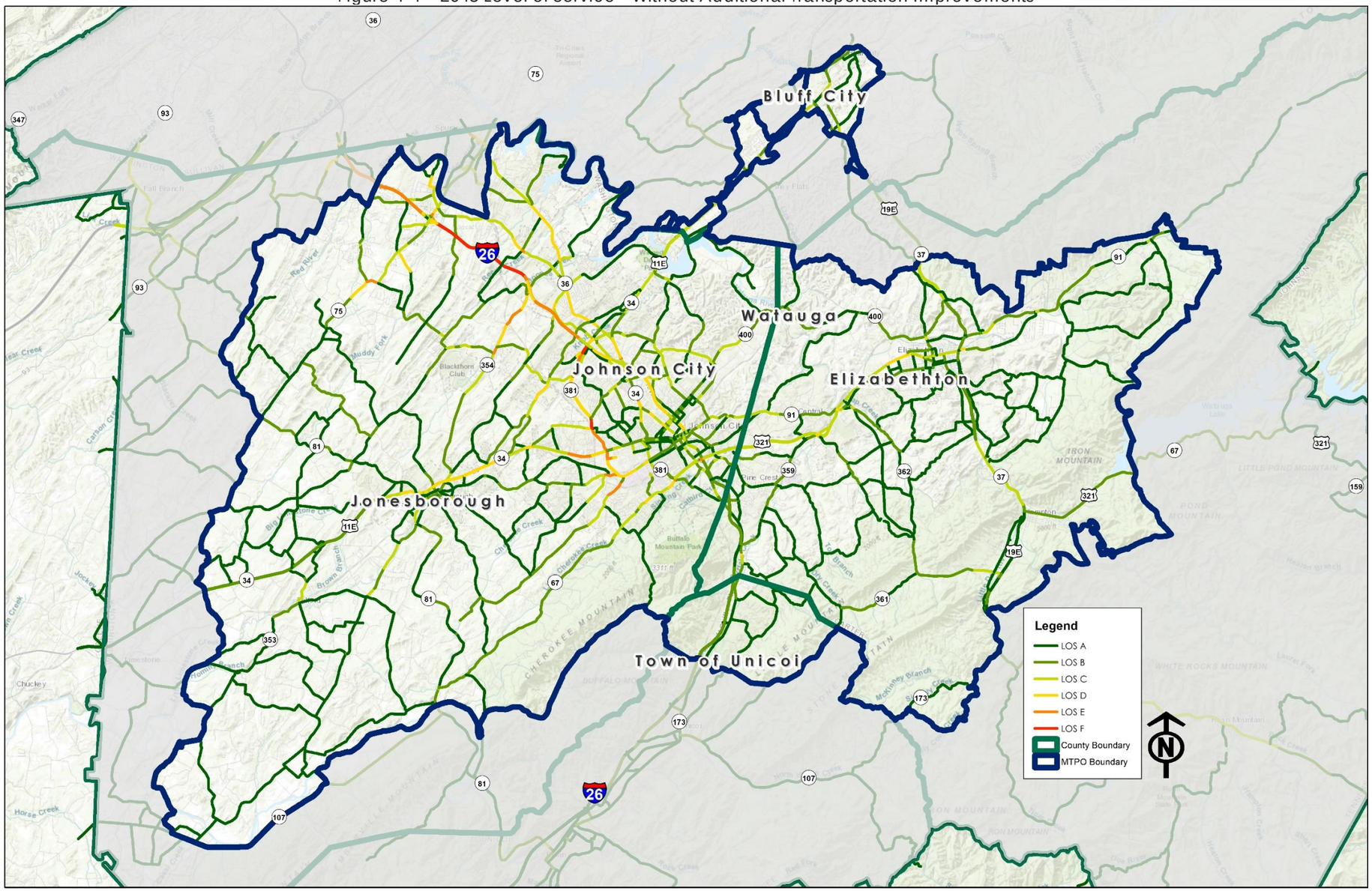


Figure 4-4 2045 Level of Service - Without Additional Transportation Improvements



Safety

Federal legislation requires that an MPO's MTP include a safety element that incorporates or summarizes the priorities, goals, countermeasures, or projects for the MPO area that are contained in the State's Strategic Highway Safety Plan. The discussions in this section are provided in accordance with these requirements and are intended to increase transportation safety for all roadway users within the Johnson City MTPO area. As illustrated in the following sections, much like other regions of the country, the Johnson City MTPO area has experienced a slight upward trend in overall vehicular crashes and fatalities but a decrease in injury crashes. These trends are consistent with national data, which are attributed to a number of factors including increased seat belt use, reductions in alcohol-related fatalities, and increased education and enforcement which have targeted various driver behaviors associated with vehicular fatalities.

Communities everywhere are searching for ways to make their roadways safer. According to data provided by the National Highway Traffic Safety Administration (NHTSA)[1], in 2015 alone, there were approximately 6.3 million crashes resulting in over 35,000 fatalities and 2.4 million injuries. In relation to 2014, this represents a 7.2% increase in fatalities and a 4.3% increase in injuries. Overall, the total number of crashes on US roadways rose by 3.8% from 2014. The national fatality rate per 100 million vehicle miles traveled increased to 1.12 from 1.08 in 2014, which was the historic low for this statistic. Table 4-5 shows the number of crashes involving vehicles by type within Washington, Sullivan, Carter, and Unicoi Counties. From the year 2011 to 2015, the Johnson City region has seen a slight increase in the total number of crashes from 9,039 to 9,904, a 6% increase. Two of the three types of crashes – fatal and property damage only (PDO) - showed an increase from 2011 to 2015. However, the number of injury crashes decreased over this same time period by approximately 10%. Over the 5-year time period on average, 40 people lost their lives annually in vehicular crashes on roadways within the region.

It is important to note that TDOT has established the performance targets, as mandated by MAP-21 and continued by the FAST Act, for safety. Specifically, targets have been set related to the 5-year rolling averages (2014-2018) established as follows:

- Number of Fatalities (1,021.4)
- Number of Serious Injuries (7,630.8)
- Fatality Rate per Million VMT (1.337)
- Serious Injury Rate per Million VMT (9.982)
- Number of Non-Motorized Fatalities and Serious Injuries (493.2)

The Johnson City MTPO has approved to support the measures and targets set by TDOT and in the coming years will be working to further utilize the outcomes of these measures to address safety needs in the MTPO area.

[1] https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812318

Table 4-5 Number of Crashes Involving Vehicles by Type (2011-2015)

Year	Number of Fatal Crashes	Number of Injury Crashes	Number of PDO Crashes	Total Number of Crashes
Carter County				
2011	8	349	848	1,205
2012	7	338	877	1,222
2013	6	267	931	1.204
2014	3	264	847	1,114
2015	6	291	996	1,293
Percent Change (2011-2015)	-25%	-17%	17%	7%
Sullivan County				
2011	15	1,240	2,785	4,040
2012	29	1,193	2,890	4,112
2013	24	932	2,815	3,771
2014	20	983	2,870	3,873
2015	14	1,037	3,117	4,168
Percent Change (2011-2015)	-7%	-16%	12%	3%
Unicoi County				
2011	2	75	232	309
2012	3	109	242	354
2013	3	99	261	363
2014	5	73	300	378
2015	2	84	297	383
Percent Change (2011-2015)	0%	12%	28%	24%
Washington County				
2011	8	665	3,094	3,767
2012	10	683	3,107	3,800
2013	12	631	2,978	3,621
2014	8	647	3,019	3,674
2015	17	683	3,360	4,060
Percent Change (2011-2015)	113%	3%	9%	8%
Total Region				
2011	33	2,329	6,959	9,321
2012	49	2,323	7,116	9,488
2013	45	1,929	6,985	8,959
2014	36	1,967	7,036	9,039
2015	39	2,095	7,770	9,904
Percent Change (2011-2015)	18%	-10%	12%	6%

Source: TN Dept. of Safety and Homeland Security, Research, Planning and Development Division

Table 4-6 shows the number of alcohol-related crashes from 2011-2015. During this time period, the region saw a 17% decrease in alcohol-related vehicular crashes.

Table 4-6 Alcohol-Related Crashes (2006-2015)

	2011	2012	2013	2014	2015	Percent Change (2011-2015)
Carter County	50	59	55	49	43	-14%
Sullivan County	134	177	120	11	90	-33%
Unicoi County	18	13	18	21	20	11%
Washington County	133	132	137	117	124	-7%
Total	335	381	330	198	277	-17%

Source: National Highway Traffic Safety Administration

Tennessee Strategic Highway Safety Plan

Improvement of highway and traffic safety depends on the "4-Es": engineering, enforcement, emergency services, and education. Engineering involves the built roadway and transportation infrastructure and encapsulates design standards; engineering warrants set forth in the MUTCD; materials and construction practices; and signage, striping, and signalization policies. Enforcement is aimed toward modifying (enforcing) human behavior. Enforcement affects drivers in the following way: a law will be enforced, an offender will be detected, the adjudicatory process will be swift and certain, and punishment will follow conviction. Emergency services include the assemblage of ambulance companies, fire rescue services, and third party emergency response units and emergency rooms/trauma centers. Obtaining accurate post-crash diagnosis and high quality post-crash care is a critical factor in transportation safety. Finally, similar to the enforcement programs that modify behavior through enforcement, education programs are intended to modify behavior through knowledge. Education encompasses driver licensing programs, driver remediation programs (e.g. traffic school), advanced driving courses, educational campaigns such as "Click It or Ticket" and "Booze it & Lose It," and school education programs aimed at K-12 and college level students. Combined, the 4-Es capture the range of transportation safety related investments that are needed to improve safety within any jurisdiction.

As previously mentioned, the FAST Act legislation requires that the MPO's MTP include a safety element that incorporates or summarizes the priorities, goals, countermeasures, or projects for the MPO area that are contained in the State's Strategic Highway Safety Plan. The discussions in this section elaborate on Tennessee's Strategic Highway Safety Plans and are provided to address the federal requirements.

The general and specific goals and strategies for improving the safety of the region's transportation system are predominantly based on the Tennessee Strategic Highway Safety Plan, which was completed in 2014. The mission, vision, and goal statements of the Tennessee Strategic Highway Safety Plans are as follows:

- *Tennessee's Mission Statement* – Using education, enforcement, engineering, and emergency response initiatives, work toward zero deaths and serious injuries by reducing the number and severity of crashes on Tennessee's roadways.
- *Tennessee's Vision Statement* – Federal, state, and local agencies, civic groups, and private industries unified as safety partners and all working together toward zero fatalities and serious injuries on Tennessee roadways.
- *Tennessee's Goals Statements* – Reduce the number of fatalities by 10% within the next five years. Reduce the rate of fatalities by 10% within the next five years. Reduce the current trend of increasing serious injuries by not exceeding the 2012 total value of 7,574 as an average over the next five years. Reduce the current trend of an increasing serious injury rate by not exceeding the 2012 total value of 10.65 serious injuries per hundred million vehicle miles traveled as an average over the next five years.

To provide the most efficient and safest highway facilities, the Tennessee Strategic Highway Safety Plan identifies data-driven emphasis areas and strategies to accomplish the goals laid out in the plan. The identified emphasis areas and strategies include:

Data Collection and Analysis

- Improve traffic data collection systems, hardware, and technology to provide data more timely and efficiently.
- Improve data collection in the field and data distribution to expedite and improve delivery of relevant data for safety analysis, infrastructure improvement, and law enforcement.

Driver Behavior

- Reduce the number of impaired drivers on Tennessee's roadways.
- Reduce aggressive driving practices among motorized road users.
- Increase usage of proper vehicle occupant restraint.
- Increase education and enforcement targeted at reducing distracted driving.
- Reduce crashes involving teen drivers.

Infrastructure Improvements

- Reduce the likelihood and severity of crashes involving vehicles departing the travel lane at high crash locations by improving roadway geometry, roadway pavement surfaces, roadsides, roadside barriers, and traffic control devices.
- Reduce the likelihood and severity of intersection-related crashes with improvements to intersection geometry, traffic control, and visibility.
- Reduce the likelihood of conflict between trains and vehicles at railroad crossings with improvements to geometry, traffic control and visibility.
- Educate roadway users and local agencies to the factors contributing to intersection, roadway departure and railroad crossing crashes. Raise awareness of roadway users to the importance of observing traffic control and adhering to traffic laws.
- Reduce the lengths of interchange exit ramp queues with improvements to interchange off-ramp capacity, geometry, and visibility.

- Improve the safety of senior drivers by reducing roadway geometric deficiencies and enhancing roadway visibility on state and interstate highways.

Vulnerable Road Users

- Improve infrastructure for bicyclists and pedestrians.
- Increase awareness of vulnerable road users.
- Improve safety of vulnerable road users on existing routes.
- Increase the effectiveness of enforcing current laws protecting vulnerable road users.
- Assess growing needs and concerns of vulnerable road users.
- Improve and strengthen laws pertaining to vulnerable road users.
- Develop and implement programs that reduce the frequency and severity of crashes specifically involving senior drivers and pedestrians.

Operational Improvements

- Reduce the number and severity of secondary roadway crashes by effective emergency response.
- Develop inter-agency memorandums of understanding.
- Improve incident response and reduce the clearance time for crashes.
- Reduce the severity and number of crashes occurring in work zones.
- Manage congestion.
- Reduce the severity of crashes involving senior drivers.

Motor Carrier Safety

- Reduce occurrence of CMV crashes.
- Improve CMV safety inspections.
- Increase inspections and training for CMV hazardous material safety.

The MTPO has been involved in a number of the initiatives described within Tennessee's Highway Safety Plan and is an active participant in the state's highway safety program. Several specific initiatives of important focus to the MTPO include improved crash data records management, improved intersection safety, improved driver behavior, and increased educational and awareness programs intended to improve transportation safety for all roadway users. Other activities include:

- Hosting a Traffic Incident Management Training workshop
- Participation in local traffic safety groups (Washington County EMS and Johnson City EMA monthly meetings, Jonesborough safety meetings, Carter County EMA Local Emergency Planning Committee meetings)
- Attendance at Tennessee's Highway and Safety Operations conference

4.2 PUBLIC TRANSPORTATION

The Johnson City Urbanized Area is served by two main public transportation entities, Johnson City Transit (JCT) and Northeast Tennessee Rural Public Transit (NET Trans). JCT serves the City of Johnson City, while NET Trans serves a larger geographic area outside the urbanized area.

Johnson City Transit (JCT)

Johnson City Transit System (JCT) began operations in 1979 as the first new municipal transit system in Tennessee since World War II. The Johnson City Transit Center, located at 137 West Market Street in downtown Johnson City, was built in 1986, as a rehab and major expansion of the existing Greyhound Bus Lines terminal. JCT operations are centered around the Transit Center, which serves not only as a transfer point for JCT patrons, but also for patrons of Greyhound Bus Lines and local taxi companies.

JCT operates fixed route service (including BUCSHOT service on/around ETSU campus) and demand-response service (including paratransit service for individuals with disabilities and Job Access service) within Johnson City corporate limits. All major commercial and institutional facilities in Johnson City are served by the JCT fixed route, including East Tennessee State University, the Mountain Home Veterans Administration Center, hospitals, shopping malls and centers, and government offices. In addition, the major residential neighborhoods and group housing complexes are served. All fixed route buses are lift-equipped (or equipped with ramps) to meet the needs of clients with special needs. The current JCT fleet is documented in Table 5-15. In addition to vehicles, JCT's other assets include the main terminal, located at 137 West Market Street, and its maintenance facility, located at the City's garage at 209 Water Street.

JCT operates eight buses on 15 fixed routes in the City. Ten of JCT's 15 fixed routes are approximately 30 minutes in length, and one bus services each route once per hour. Four fixed routes are approximately 45 minutes in length, and one bus services each route once per hour and a half. One fixed route is approximately 60 minutes in length. All JCT fixed routes begin and end at the Transit Center with the exception of the evening service. JCT's fixed route services operate Monday through Friday from 6:15 a.m. to 6:15 p.m. and on Saturday from 8:15 a.m. to 5:15 p.m. A separate evening service runs Monday through Friday from 6:15 p.m. to 11:00 p.m. as well. JCT does not operate on Sundays or major holidays. Fixed route base fare is $1.00. Seniors (age 65 and over), children (grades K-5), and individuals with disabilities or with Medicare cards pay a half-fare of 50 cents. Children under the age of five ride free. Discounted multi-ride passes are available. Transfers are free.

In addition to the 15 fixed routes, the East Tennessee State University (ETSU) campus area is served by the JCT BUCSHOT fixed routes, which is open to the public. The BUCSHOT service began in August 2003 through a contractual agreement between JCT and ETSU. The BUCSHOT provides shuttle service on the ETSU campus and adjacent housing areas and serves to connect with the other JCT fixed route services via various stops throughout the campus area. BUCSHOT is provided during ETSU Fall and Spring semesters with varying loops around campus that have 15 to 20 minute headways and run from 7:30 a.m. to 5:00 p.m., Monday through Friday. BUCSHOT service also includes an evening route that operates on fixed-route schedule from 5:00 p.m. until 10:45 p.m., Monday through Friday, and call-in Safe Voyage service, which is available from 10:45 p.m. until midnight, Monday through Friday. ETSU students, faculty, and staff, as well as the public, ride the BUCSHOT for free. ETSU students, faculty, and staff may also ride the entire JCT fixed route bus system for free with a valid ETSU I.D.

JCT also provides a curb-to-curb demand-response transportation service for the mobility impaired in Johnson City. The "XTRA" service is provided for those unable to use the regular fixed route service. Riders are required to give 24-hour notice of requested trip. XTRA hours of operation are the same as for fixed route services. The JCT "XTRA" service area is the corporate city limits of Johnson City, TN, or ¾ mile from a JCT fixed route, whichever provides furthest service to the JCT patron. The fare for XTRA is $2.00 per one-way trip if the trip is located with ¾ mile of the fixed route service area. Buses for XTRA are equipped with wheelchair lifts, grab rails, and low steps.

JCT operates a Job Access service to "bridge the transportation gap" between low-income individuals, welfare recipients, and disabled individuals and their places of employment and/or employment-related activities. Job Access service is provided within the corporate limits and is provided as a supplemental service to the fixed route system. Job Access riders whose origin (residence) or destination (place of employment or employment-related service) is on the JCT fixed route service, and whose trip is during fixed route operating hours, ride the fixed route to the JCT Transit Center, where they are picked up by a Job Access demand response vehicle to complete the portion of their trip which is not on the fixed route. Job Access riders whose trips are outside fixed route operating hours, or who have trips with both origin and destination outside the fixed route service area, ride in a Job Access demand response vehicle during the entire trip.

Job Access service is available from 5:30 a.m. until midnight, Monday through Saturday (excluding holidays). Reservations must be made at least two days in advance of a Job Access demand response trip. Job Access service is provided using small buses or vans, which are also equipped with wheelchair lifts (or ramps), grab-rails, and low steps to accommodate riders with special needs. The Job Access fare is $2.50 per one-way trip.

Figure 4-5 and Figure 4-6 illustrate the JCT fixed route system map for daytime and evening routes, respectively, and Table 4-7 provides JCT ridership trends over the last five years for both fixed route and demand response services. Even though Table 4-7 shows that the overall trend for JCT ridership has decreased slightly, the regular fixed route trips, when excluding BUCSHOT trips, are increasing. JCT BUCSHOT ridership has decreased due to decreased service hours on campus and overall change in the State funding formula. Demand Response trips are also increasing, with a slight decrease shown in FY 2013.

Currently, there are pockets of residents within the Johnson City Urbanized Area that are not fully served by JCT fixed routes or the rural transit provider, NET Trans, discussed later in this section. As such, the Johnson City MTPO is conducting a Comprehensive Operational Analysis on JCT that will review the current system and provide service alternatives to improve the operations of the system. The analysis is scheduled to be completed by the first of 2018.

Table 4-7 JCT Fixed Route & Demand Response Ridership (2011-2016)

Fiscal Year (FY)	Fixed Route			Demand Response		
	Trips	Absolute Change	Percent Change	Trips	Absolute Change	Percent Change
FY 2011	603,804	-	-	40,032		-
FY 2012	666,639	62,835	10%	45,564	5,532	14%
FY 2013	690,611	23,972	4%	42,458	-3,106	-7%
FY 2014	677,227	-13,384	-2%	45,708	3,250	8%
FY 2015	613,656	-63,571	-9%	47,507	1,799	4%
FY 2016	607,247	-6,409	-1%	47,405	-102	0%

Source: JCT, MTPO

Figure 4-5 JCT Daytime Transit Routes

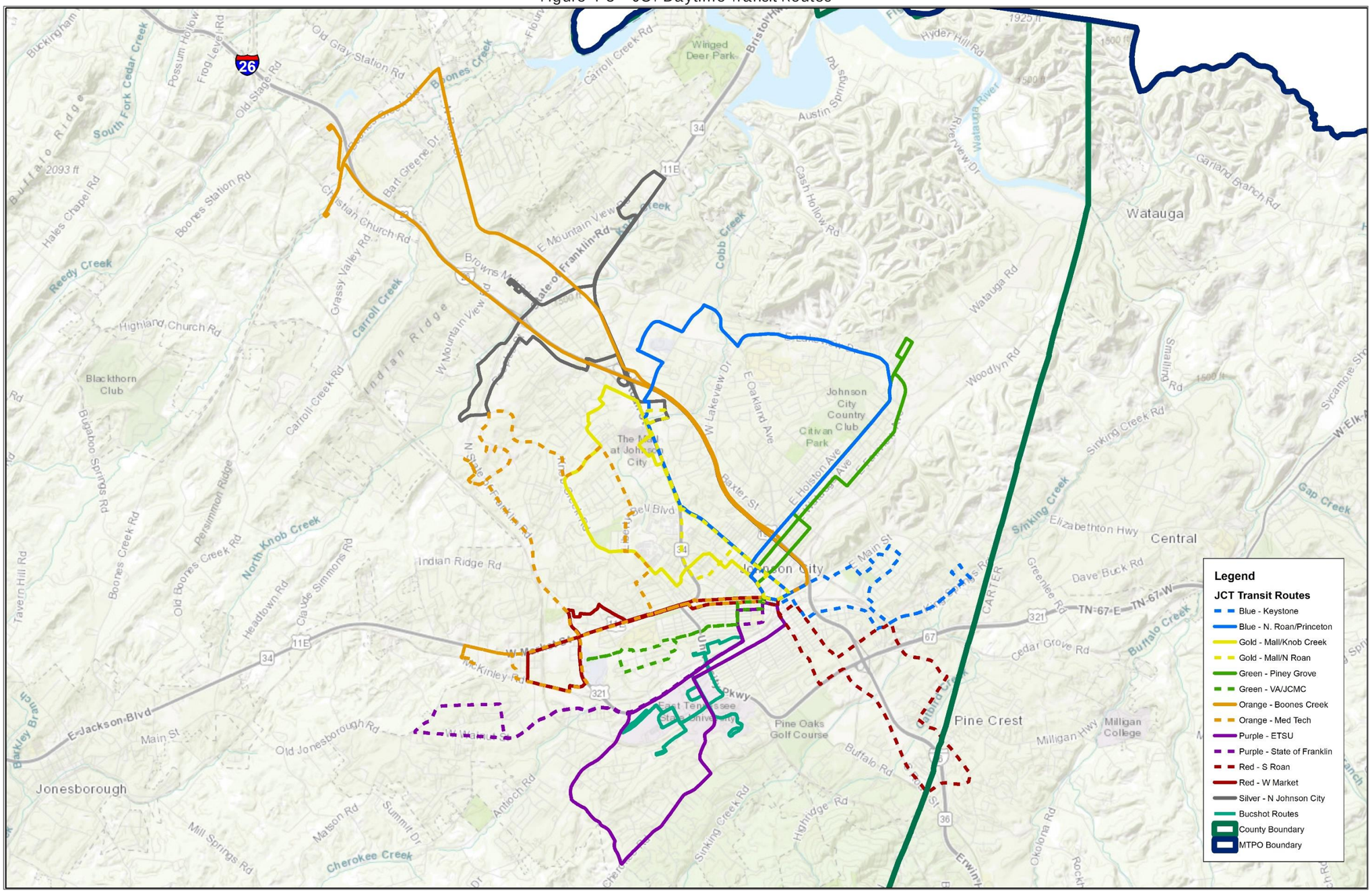
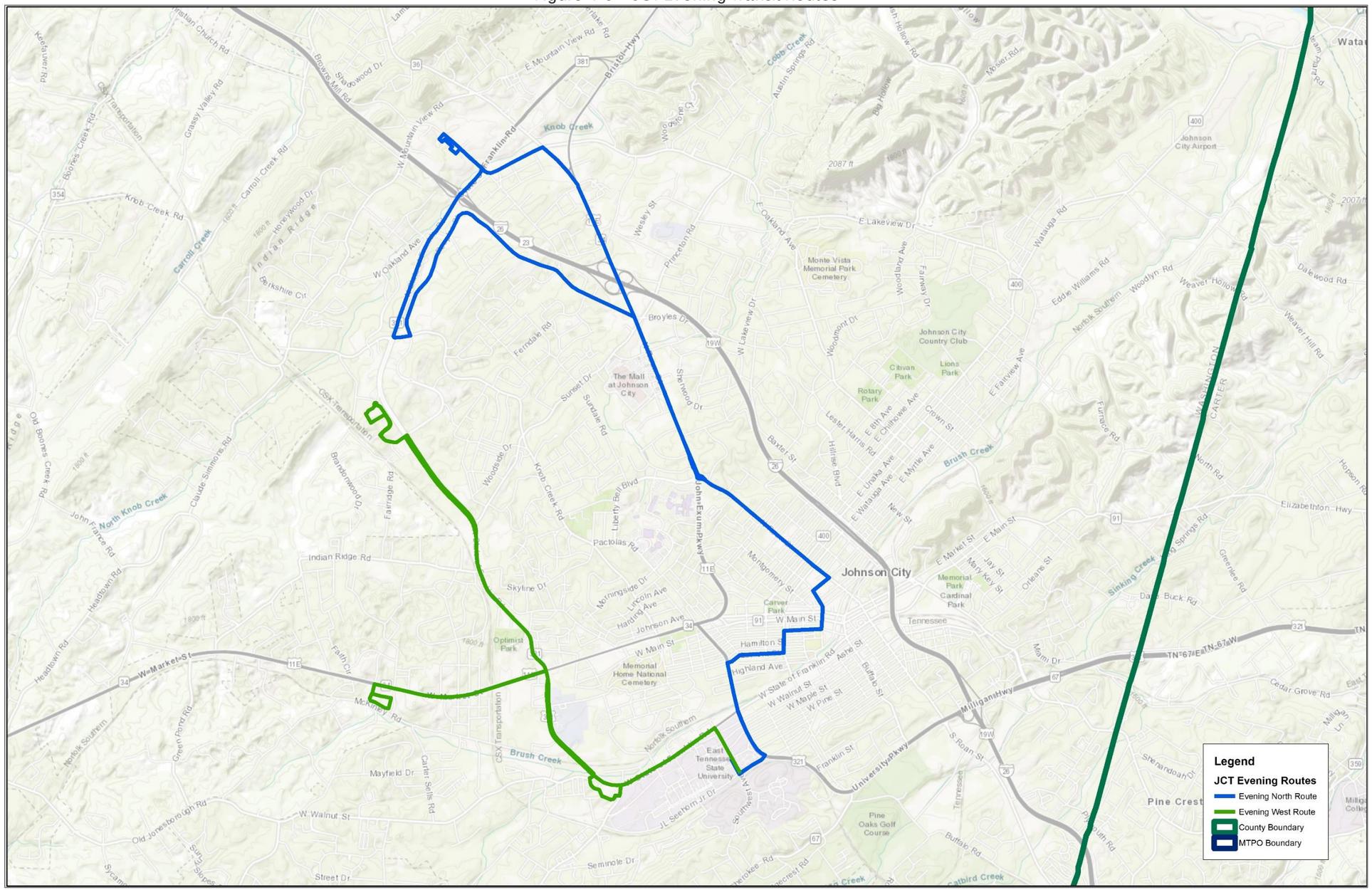


Figure 4-6 JCT Evening Transit Routes



NET Trans (Northeast Tennessee Rural Public Transit)

NET Trans (Northeast Tennessee Rural Public Transit) is the service provider of First Tennessee Human Resource Agency (FTHRA) with services to an eight-county region outside of JCT's service area, including Washington, Carter, Unicoi, and Sullivan counties. NET Trans provides services with trip origins or destinations within the rural areas, and also provides for trips with an origin and destination within the Johnson City Urbanized Area using funds other than those granted by FTA.

NET Trans has built a quality rural public transportation program using local, state, and federal dollars. They use various lift-equipped vans and generally operate on routes and schedules dictated by the needs of patrons. Operating hours are Monday through Friday, between the hours of 6:00 am and 6:00 pm, excluding holidays, and fares are zone-based, ranging from $2.00 to $12.00 per one-way trip. NET Trans provided approximately 168,000 trips in 2016, running over 3 million miles.

In addition to providing the general public transportation in the non-urbanized area, NET Trans also provides Families First Transportation and Job Access service. The Families First Program is funded through the Tennessee Department of Human Services and provides transportation to and from work and required classes for eligible clients. The Job Access Program provides transportation to and from work and work-related activities (child care centers) for eligible clients. The service is especially designed to link rural areas with job opportunities. The program can accommodate shift work and weekends.

Table 4-8 provides NET Trans ridership trends over the last five years for demand response services. NET Trans briefly offered a fixed route service as a pilot project starting in 2011, but it was discontinued in 2014.

Table 4-8 NET Trans Fixed Route & Demand Response Ridership (2011-2016)

Fiscal Year (FY)	Demand Response Trips	Absolute Change	Percent Change	Service Miles	Absolute Change	Percent Change
FY 2011	163,202	-	-	3,661,716	-	-
FY 2012	159,186	-4,016	-2%	3,049,267	-612,449	-17%
FY 2013	147,975	-11,211	-7%	3,773,178	723,911	24%
FY 2014	152,405	4,430	3%	2,493,597	-1,279,581	-34%
FY 2015	156,757	4,352	3%	3,233,207	739,610	30%
FY 2016	167,921	11,164	7%	3,239,612	6,405	0%

Source: NET Trans, MTPO

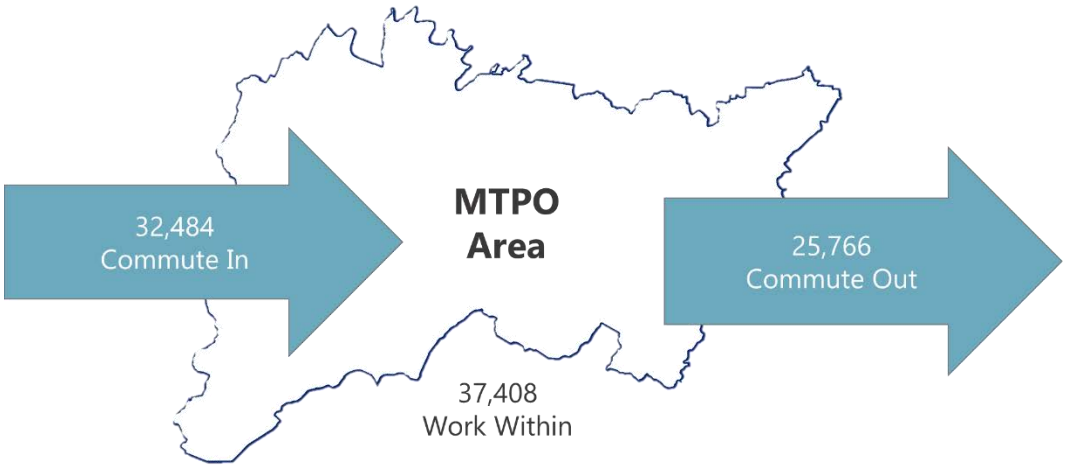
Other Transit Activities

In addition to public transportation services provided by JCT and NET Trans, there are other passenger bus services operating within the MTPO area. Greyhound Lines, Inc. provides intercity bus service within the Johnson City MTPO area, with four daily arrivals via its national service network. Greyhound buses arrive and depart from the Greyhound passenger station at the JCT Transit Center connecting with the Greyhound national route system. Greyhound service is provided seven days per week and on holidays.

Commuting Patterns in the MTPO Area

According to US Census data, in 2014 approximately 32,000 people commute into the MTPO area each day for work, and nearly 26,000 residents living in the MTPO area commute outside for work as shown in Figure 4-7. Average commute times across the four counties range from 20 to 23 minutes.

Figure 4-7 Commuting Patterns (2014)



Future Conditions

Transit services, both fixed route and demand response, within the MTPO area are an integral part of the current transportation system. The need and demand for public transportation services in the MTPO region is clearly demonstrated as seen in the ridership numbers of JCT and NET Trans, commuting patterns in the region, and demographic and development characteristics of the region.

In 2017, JCT in coordination with the MTPO completed the development of a Coordinated Public Transit-Human Services Transportation Plan (CPTHSTP) for the Johnson City Urbanized Area. The requirement for a CPTHSTP was first called for under SAFETEA-LU and reaffirmed under the FAST Act as a requirement for a region to be eligible to receive certain federal public transportation funding. The CPTHSTP planning effort took approximately six months to develop and engaged a wide variety of transportation and human service providers. Table 4-9 contains the resulting transit service strategies and priorities established as part to the MTPO's CPTHSTP. A key theme in addressing service

gaps and unmet needs was the provision of an expanded service area and expanded service hours.

Table 4-9 Transit Service Strategies & Priorities

Topic	Strategies	Rank	Total Points
Service Expansions	Increased evening service	1	74
	Same-day service for ADA clients	2	72
	Increased evening service for ADA clients	3	68
	More frequent service	4	65
	Geographic service expansions within the Urbanized Area	5	55
	Sunday service	6	35
	Special event service	7	32
Topic	**Strategies**	**Rank**	**Total Points**
Information and Awareness	Increase Targeted Outreach Related to Available Services	1	55
	Increase General Public Outreach Related to Available Services	2	54
	Increase Coordination Between Providers	3	44
	Increase Awareness of Transit Benefits in Community	4	42
	Increase Technology Use	5	41
	Educate Community Leaders on Transit Needs	6	30
Topic	**Strategies**	**Rank**	**Total Points**
Other Investment Alternatives	Increased rider assistance	1	69
	First-mile / last-mile improvements (sidewalks, curb ramps, etc.)	2	59
	Service to outlying areas within urbanized area	3	46
	Bus stop amenities	4	42
	Service to other urban areas in the region	5	36
	Newer transit vehicles	6	34

As the urbanized area of the MTPO continues to grow, JCT will face increasing challenges and demands. Johnson City is rapidly growing north into the Boones Creek community. This area is experiencing a significant amount of both employment and residential growth. Service expansion and the development of a transfer center in this area are likely over the planning horizon.

Additionally, in 2016, TDOT developed a Coordinated Public Transit-Human Services Transportation Plan (CPTHSTP) for the Tri-Cities region which encompassed a 10-county area including the counties of Carter, Greene, Hancock, Hawkins, Johnson, Sullivan, Unicoi, and Washington counties in Tennessee and Scott and Washington counties in Virginia.

The Tri-Cities region CPTHSTP outlines current service providers in the region for both rural and urban areas, identifies service gaps and unmet needs, and suggests short- and long-term strategies to address those needs. Among these needs are lack of available information and marketing for all services, insufficient connectivity or coverage between urbanized areas, urban centers, and rural areas, and the lack of funding to expand and maintain the existing transit services. Short-term strategies include:

- Enhancing planning activities and public education efforts to raise awareness of transit opportunities within the region.
- Exploring the development of a one-stop transportation call center to coordinate services.
- Reviewing service routes and expanding service to key activity centers currently underserved or not served by transit, paratransit, or service agencies.
- Evaluating current accessibility to transit stops and identify ways to improve first-mile and last mile connections.
- Expanding service hours to include weekday early morning and evening service.
- Expanding service hours to include weekend service.
- Identifying funding opportunities for capital improvements or service expansion.
- Identifying funding opportunities to purchase technology systems to improve operations and customer service.

Additionally, as illustrated in the MTPO's CPTHSTP, a high level of coordination currently occurs between human service agencies, JCT, and NET Trans in the provision and funding of transportation services within the region. An important element of the MTPO's future transportation system is the need to continue to provide coordinated transportation services. The MTPO will continue to facilitate the development of the region's CPTHSTP (which is on the same update cycle of the MTPO's MTP) as a means of promoting efficient and effective use of limited transportation resources while increasing mobility to those who most need it.

4.3 WALKWAYS AND BIKEWAYS

While non-motorized travel traditionally does not receive the same level of visibility as automobile travel, the MTPO area has made considerable progress in promoting non-motorized travel as an integral component to the overall transportation system over the last two decades. The MTPO area currently has numerous bicycle and pedestrian transportation facilities. On a local level, these facilities provide connections to destinations and are used for both transportation and recreational trips.

The following subsection provides an assessment of current conditions (sidewalks, bikeways, and greenways) within the MTPO area, an assessment of sidewalk, bikeway, and greenway needs, and recommended improvements for walking and biking within the MTPO area.

Sidewalks

Currently, approximately 288 miles of roadway within the MTPO area have sidewalks. As illustrated in Figure 4-8, the bulk of these sidewalks are located in the City of Johnson City (which has approximately 219 miles of roadways with sidewalks) followed by the City of Elizabethton (which has approximately 60 miles of roadways with sidewalks). The Town of Jonesborough has about 5 miles of roadways with sidewalks. The majority of sidewalk facilities throughout the region are located along local streets.

Bikeways

In the MTPO area there are approximately 29 miles of bicycle accommodations (bike lanes and multi-use paths). Of these facilities, 6 miles are signed and striped bicycle lanes and 23 miles are multi-use paths. Figure 4-8 shows the location of these facilities within the region.

As part of the MTPO's 2040 LRTP, developed in 2012, a series of recommended bicycle and pedestrian improvement projects were established. Figure 4-9 shows the specific recommended facility improvements, which were selected to:

- Provide connectivity between major origins and destinations
- Serve concentrations of attractors
- Provide direct routes
- Help form a connective network of bikeways
- Extend in each major direction within the MTPO area

Of these proposed improvements, one of the most significant bicycle and pedestrian projects is the development of a rails-to-trails project between Johnson City and Elizabethton. In early 2012, the MTPO initiated the development of a master plan for converting the existing East Tennessee Rail line from Johnson City through Elizabethton to a multi-use trail system. The completion of this rail line conversion to bicycle and pedestrian infrastructure provides the MTPO area with a significant addition to the region's overall non-motorized network. The trail was completed in 2015 and is now known as the Tweetsie Trail.

Section 5.0 of the MTP provides a program approach to providing funding over the planning horizon for non-motorized accommodations. While recommended bicycle and pedestrian improvements have been developed and local municipalities, such as Johnson City, are planning for sidewalk and bikeway facilities, the region would benefit from a standalone regional bicycle and pedestrian plan. Within the next 3 to 5 years the MTPO proposes developing such a plan to forge greater integration and inclusion of non-motorized accommodations into the MTPO's overall transportation system.

Figure 4-8 Existing Bicycle & Pedestrian Facilities Map

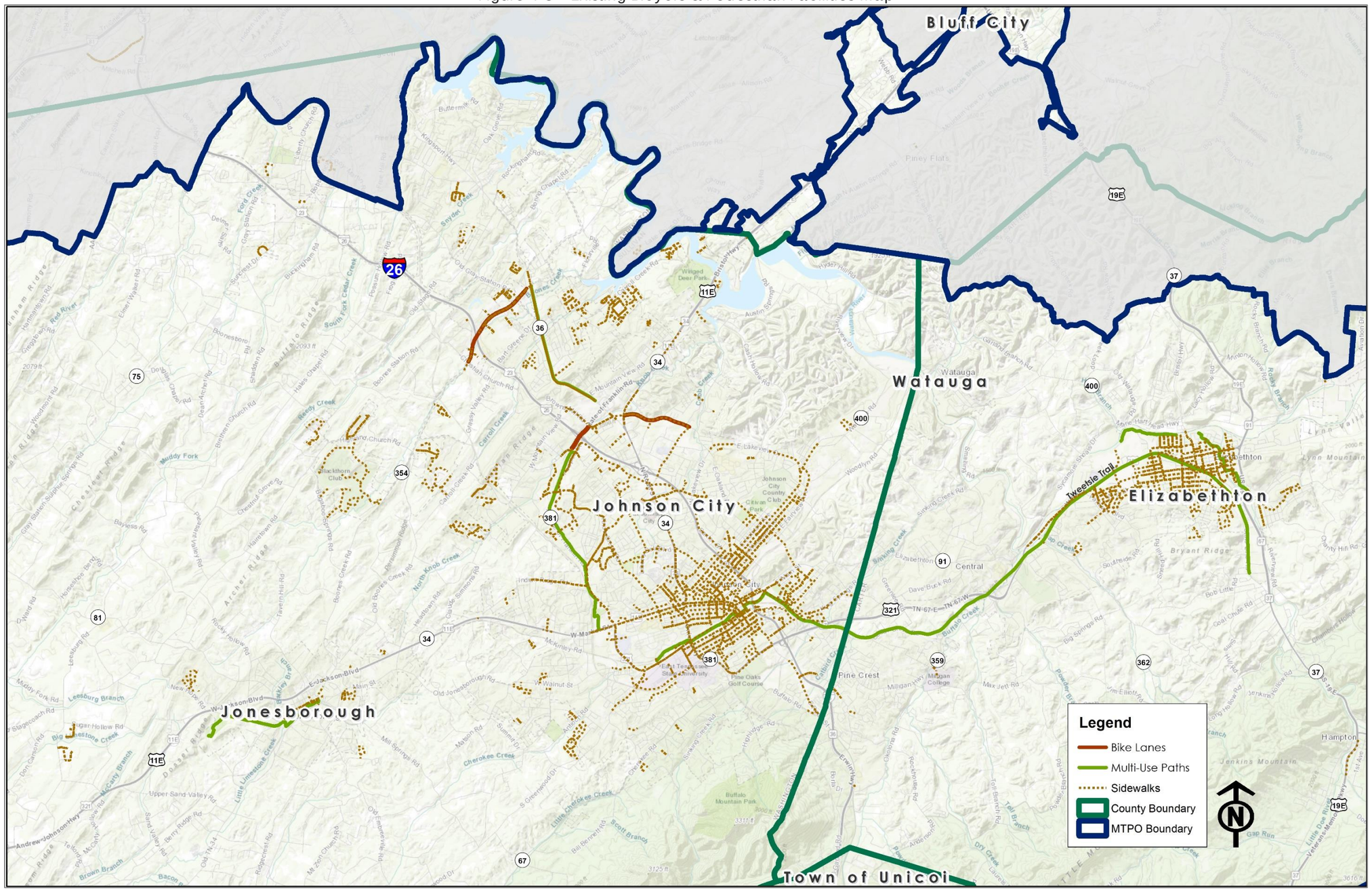
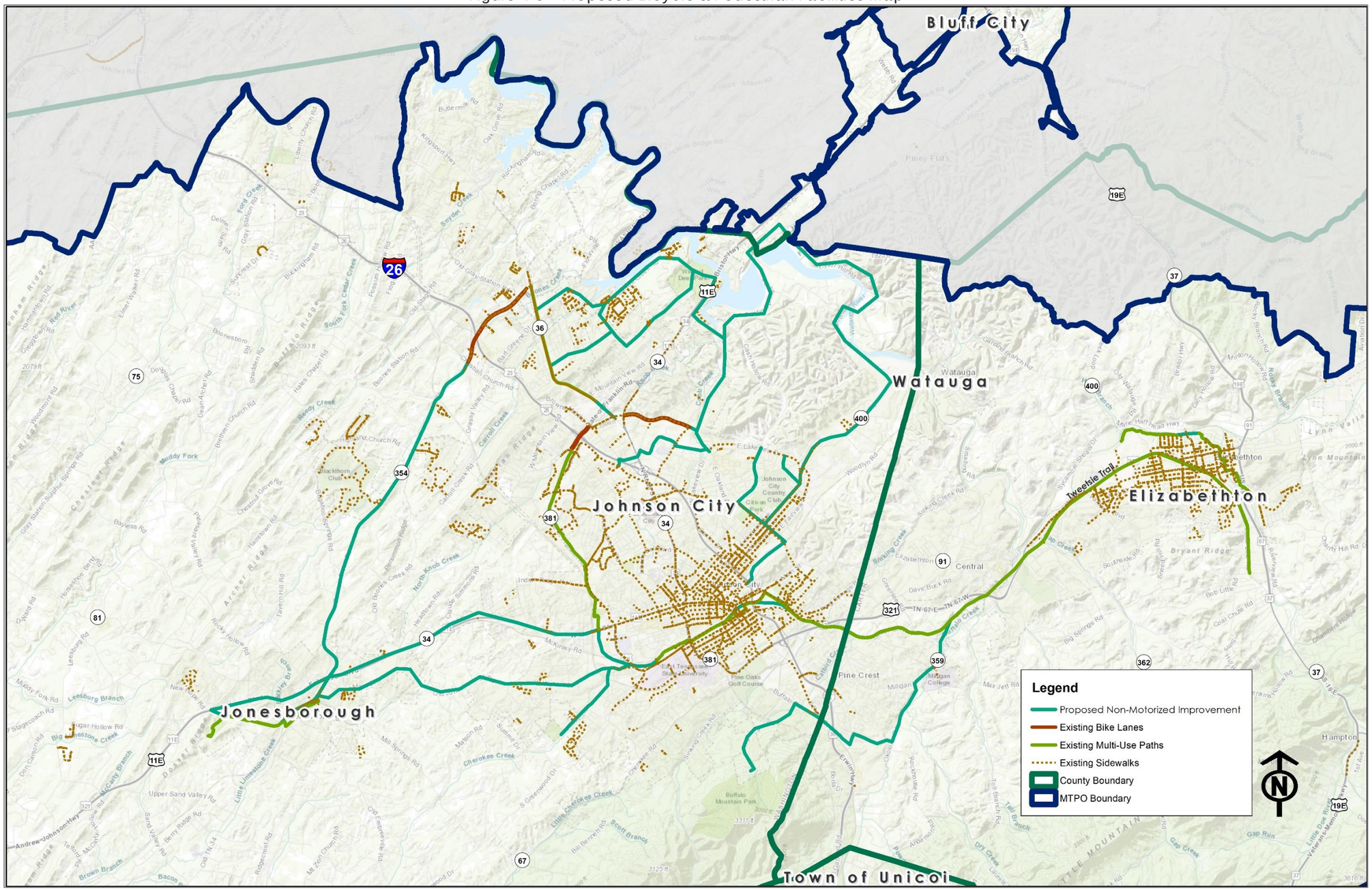


Figure 4-9 Proposed Bicycle & Pedestrian Facilities Map



Safety

Pedestrians and cyclists are among the most vulnerable roadway users on our transportation system. The state of Tennessee had 108 pedestrian fatalities and 10 cyclist fatalities during 2015. Table 4-10 shows the pedestrian and cyclists crashes in each of the four counties in the region from 2011 to 2015.

Table 4-10 Bicycle and Pedestrian Crashes (2011-2015)

Year	Sullivan County		Carter County		Washington County		Unicoi County		Total	
	Cyclist	Pedestrian	Cyclist	Pedestrian	Cyclist	Pedestrian	Cyclist	Pedestrian	Cyclist	Pedestrian
2011	11	35	4	5	16	20	1	1	32	61
2012	7	27	2	5	10	26	0	1	19	59
2013	6	28	2	3	13	13	0	1	21	45
2014	12	34	5	3	12	16	1	4	30	57
2015	9	37	2	6	8	42	1	3	20	88

As pedestrian and bicycle travel increases in the MTPO area, it is important for the Johnson City region to design facilities that accommodate walking and biking. Policies should be created that encourage the evaluation of bicycle and pedestrian facilities as part of new roadway projects. Where the facilities are deemed necessary, the type of facility should be designed with consideration of the safety of all roadway users. Additionally, in addressing bicycle and pedestrian safety issues, it is critical to work in cooperation with local and state law enforcement to reduce violations of traffic rules intended to protect non-motorized users.

4.4 Freight Transportation System

Rail

At the present time, there are no passenger rail services in the MTPO area. However, there are currently two Class I railroads, CSX and Norfolk Southern, that serve the Johnson City region. The CSX line runs from the northwest corner to the southeast corner of Washington County. Norfolk Southern runs from east Washington County through Johnson City and into Carter County where it takes a northerly turn to the rail yard in Bristol, Virginia. From this point, the rail line has access to the port of Norfolk in Virginia and other markets in the Northeast. Figure 4-10 shows the locations of the rail lines.

CSX operates and maintains nearly 1,600 miles of track in Tennessee and employs approximately 1,500 Tennessee residents. Norfolk Southern operates approximately 830 miles of track in the state and has about 1,830 employees. The Norfolk Southern lines in East Tennessee are part of a larger north-south route serving as a North American Free Trade Agreement route between the Northeastern region of the United States and Mexico.

While rail operations in the Tri-Cities region have changed in recent years with closure of Eastman Chemical Company's intermodal operations and the reduction of train operations in Erwin due to reduced coal traffic through the region, Norfolk Southern is expanding its intermodal capabilities as part of Norfolk Southern's Crescent Corridor, a

2,500-mile rail route that will link key markets in the Northeast and Southeast with high-quality rail intermodal services and could provide direct benefit to the Johnson City area.

Aviation

There are three airports serving the Tri-Cities region; two are located inside the MTPO planning area and one is located northwest of the MTPO planning area. The two located within the MTPO area, the Johnson City Airport and the Elizabethton Municipal Airport, are small General Aviation airports used mostly by smaller private planes and flight training facilities. The largest and only airport facility in the region having commercial passenger and air cargo flights is the Tri-Cities Regional Airport, which serves the entire northeast Tennessee and southwestern Virginia region.

The Johnson City Airport is a privately-owned facility whereas the Elizabethton Municipal Airport is owned by the City of Elizabethton. The Tri-Cities Regional Airport is jointly owned by the cities of Kingsport, Johnson City, Bristol Tennessee/Virginia, and Sullivan and Washington Counties. Figure 4-11 shows the location of these three airport facilities.

At this time, of the three airport facilities, from the perspective of intermodal transportation with surface transportation demand, the Tri-Cities Regional Airport has the greatest impact and influence in the region. Of the two other airports, the Elizabethton Municipal Airport has the potential for greater private plane operations and some air cargo followed by the Johnson City Airport. The following are key highlights of each of these airport facilities:

Tri-Cities Regional Airport

The airport recently expanded services to better serve the Tri-Cities area with passenger, charters, and air cargo activity. The Tri-Cities Regional Airport recently became an authority. It is governed by a 12-person Authority appointed by the Cities of Kingsport, Bristol, Johnson City, TN and Bristol, VA; Washington and Sullivan Counties, TN. It has an asphalt surface primary runway to the length of 8,000 feet and a secondary runway to 4,447 feet. Airlines servicing the Tri-Cities area include American Connection, Delta, and Allegiant Airlines. Top destinations served by the Tri-Cities airport include Atlanta, GA and Charlotte, NC.

The Bureau of Transportation Statistics publishes data related to passenger enplanements for each year. For the year ending July 2015, there were approximately 216,000 passenger arrivals and 218,000 passenger departures. As of July 2016, the passenger arrivals and departures had decreased to approximately 207,000 and 208,000, respectively. This represents an approximate 4% decrease in passenger enplanements over the past year. Despite the fact that there are less passengers flying out of the airport, the number of flight departures has increased from 4,060 in 2015 to 4,116 in 2016, which is approximately a 1.4% increase.

Air cargo volumes have fluctuated over the years, going from less than 200,000 pounds in 1948 to a high of about 10.3 million pounds in 1987. In the 1990s air cargo volumes dropped to a low of roughly 3 million pounds and fluctuated between 4 and 5 million pounds in the early 2000s. The total tonnage of freight mail passing through the airport

decreased by approximately 53% in the past year, from 83,000 pounds in 2015 to 39,000 pounds in 2016. Changes in air freight business and an increasing reliance on cheaper ground transportation has made traditional air cargo carrier service extremely challenging for smaller communities. The reduction in size of airline aircraft over the past 20 years and the decrease in "belly" cargo capacities have significantly shifted the emphasis towards scheduled and non-scheduled air cargo carriers. The combination of smaller airline aircraft and faster/cheaper truck transportation has also contributed to a downward trend in airmail processed through the Airport over the last two decades.

As revealed in the Tennessee Statewide Aviation System Plan, major capital improvements for Tri-Cities Regional Airport through 2020 include further expansion of the cargo area and additional corporate hangar development. Major improvements through 2030 include multiple runway extensions and parallel taxiways, as well as a new runway, parallel taxiway, and taxiway extension.

Elizabethton Municipal Airport

Located in the City of Elizabethton, the Elizabethton Municipal Airport is strategically located off SR 91 northeast of US 19E. The airport is located adjacent to a high amount of industrial lands which makes for the potential of future air cargo operations as industrial development in the area grows. The airport has a runway of 4,500 feet in length and is considered full service providing refueling, maintenance, storage, basic amenities, and comprehensive flight training.

Johnson City Airport

The Johnson City Airport is located in the City of Johnson City off SR 400, north of the downtown. As with the Elizabethton Municipal Airport, the Johnson City Airport is located adjacent to a high amount of industrial lands. The Johnson City Airport is primarily used by smaller planes and has about half the flight activity of the Elizabethton Airport. The airport has a runway of 3,000 feet in length.

Figure 4-10 Rail System

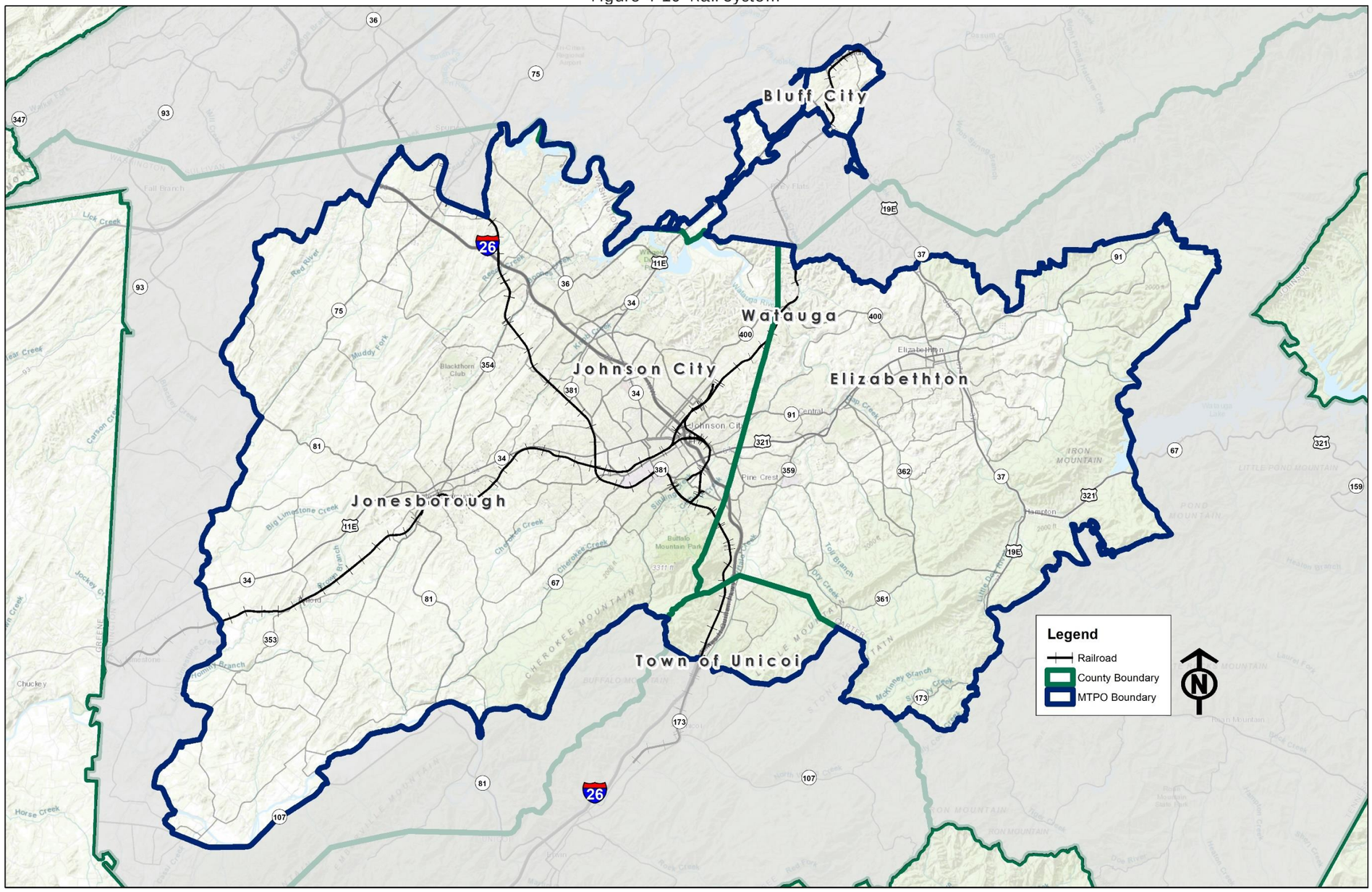
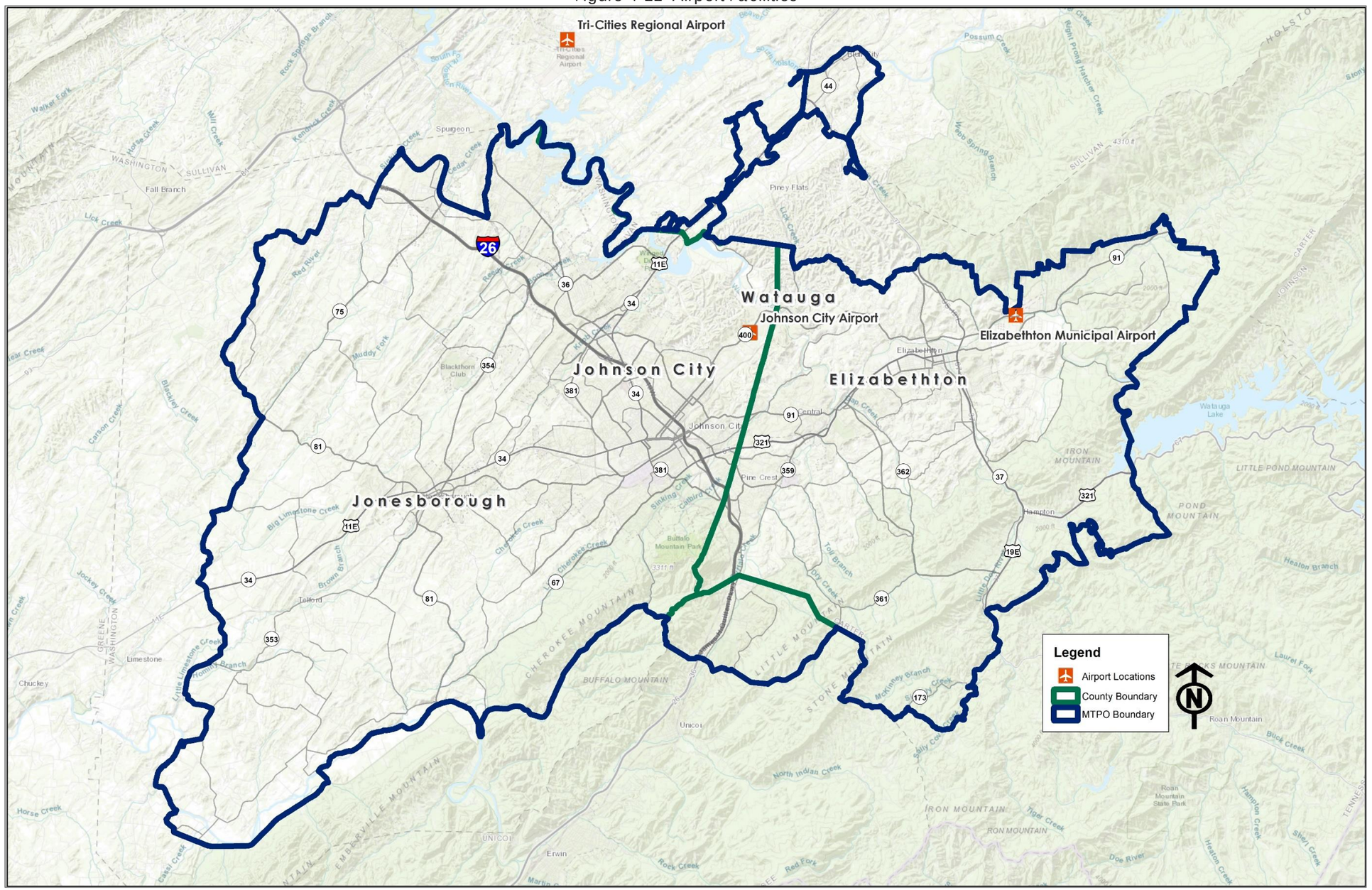


Figure 4-11 Airport Facilities



Freight Economy

The increasing economic competitiveness among regions within the US, and the globalization of the economy, has further increased the importance of a metropolitan area's freight transportation infrastructure. The changing nature of business practices, with an emphasis on reliable, just-in-time delivery (JIT), places a premium on the efficient operation of the freight transportation system. It also increases the burden on that infrastructure. Globalization of the economy has also changed the transportation and service requirements of shippers and receivers. Manufacturers can serve markets globally, but this requires a greater reliance on and greater efficiencies in the transportation system.

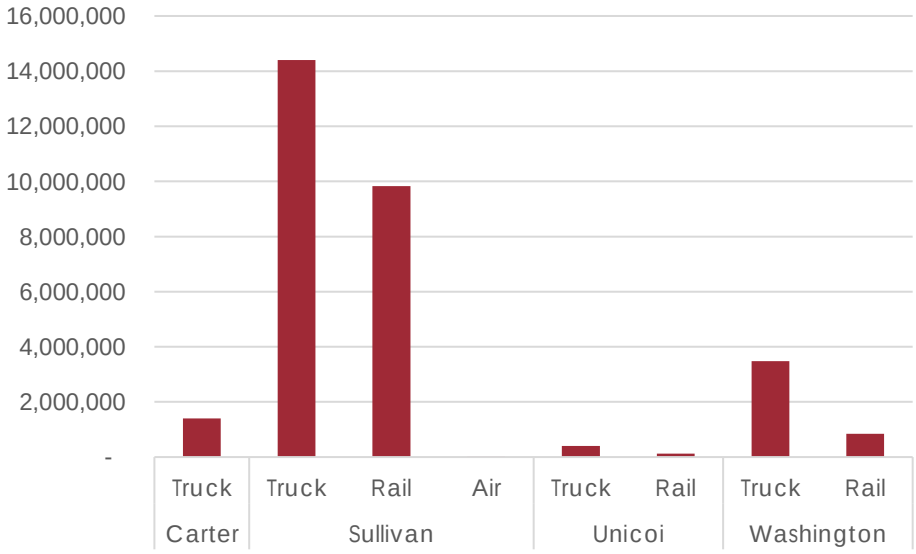
The following subsections describe the current commodity flows within and throughout the region, a general understanding of intermodal connections (highway, rail, and air) within the region, and a comparison of these modal demands to the recommended planned transportation improvements.

Commodity Flows

An analysis of commodity flows was performed based on the 2012 TRANSEARCH commodity flow data purchased by TDOT from IHS Global Insight. This data provides freight flows by weight moving into, out of, within, and through the State of Tennessee for 2012. This data is disaggregated by commodity, mode, and origin/destination pair. The commodity flow analysis provides summaries of these characteristics.

Annually, over 30 million tons of goods are transported in and out of the counties of Carter, Sullivan, Washington, and Unicoi, Tennessee. Truck transport represents about 65% of all commodities flowing into and out of the region. Rail transport represents about 35% of all commodities flowing into and out of the region. Air cargo represent less than 1% each of all commodities flowing into and out of the region. Figure 4-12 identifies the total freight share by mode for Carter, Sullivan, Washington, and Unicoi Counties, Tennessee.

Figure 4-12 Total Freight Share (By Weight & Mode) For MTPO Counties (2012)



As illustrated above, one of the primary means of transporting goods to and from the counties in the Johnson City region is by truck. Table 4-11 shows the top ten imports by tonnage coming into each of the four MTPO counties via trucks. Table 4-12 shows the top ten exports by tonnage leaving each of the four MTPO counties via truck. Table 4-13 shows the top ten origins and destinations by BEA economic areas and tonnage for truck traffic entering and exiting the MTPO counties. BEA economic areas define the relevant regional markets surrounding metropolitan statistical areas and are used by both public and private sectors to monitor and evaluate changes in economic growth for labor, products, and information.

It can be seen that the top ten commodities, both in terms of imports and exports, largely relate to the predominant industries found in the MTPO area. The primary origins and destinations for the goods brought in and shipped out of the four-county region are primarily located in the southeastern US. BEA geographies in North Carolina, Alabama, Kentucky, and Tennessee comprise the top five freight origins and destinations for the Johnson City MTPO area.

Table 4-11 Top Ten Imports by Tonnage and County

	Commodity	Tons	Percent of County
Carter	Gravel and Crushed Stone	599,436	50%
	Other non-metallic mineral products	76,097	6%
	Natural Sands	66,995	6%
	Gasoline	45,573	4%
	Other products of petroleum refining, and coal products	37,280	3%
	Dolomite	28,814	2%
	Fuel Oils	21,107	2%
	Fresh or chilled edible vegetables and dried vegetables	13,891	1%
	Non-alcoholic beverages. and ice	9,515	1%
	Furniture, Mattresses and Mattress Supports, Lamps, Lighting Fittings, and Illuminated Signs	8,899	1%
Sullivan	Gravel and Crushed Stone	1,007,361	11%
	Organic chemicals	794,044	9%
	Other chemical products and preparations	694,934	8%
	Fertilizers and Fertilizer Materials	676,974	7%
	Non-metallic waste and scrap, except from food processing	668,305	7%
	Fresh or chilled edible vegetables and dried vegetables	621,072	7%
	Other non-metallic mineral products	322,185	4%
	Essential oils and resinoids, and perfumery, cosmetic, or toilet preparations	313,056	3%
	Inorganic chemicals	282,303	3%
	Fresh-cut flowers, plants, and parts of plants, and other agricultural products	215,027	2%
Unicoi	Other non-metallic minerals	70,415	27%
	Gasoline	17,747	7%
	Gravel and Crushed Stone	9,328	4%
	Other non-metallic mineral products	8,399	3%
	Fuel Oils	8,220	3%
	Other chemical products and preparations	7,611	3%
	Fertilizers and Fertilizer Materials	7,096	3%
	Locomotives and rolling stock, railway track fixtures and fittings, mechanical or electro-mechanical traffic-signaling equipment, and inter-modal containers	5,579	2%
	Non-metallic waste and scrap, except from food processing	5,364	2%
	Other products of petroleum refining, and coal products	4,818	2%
Washington	Gravel and Crushed Stone	465,286	21%
	Other non-metallic mineral products	202,774	9%
	Non-metallic waste and scrap, except from food processing	107,317	5%
	Gasoline	87,467	4%
	Other products of petroleum refining, and coal products	63,508	3%
	Natural Sands	61,306	3%
	Fresh or chilled edible vegetables, and dried vegetables	57,689	3%
	Non-alcoholic beverages and ice	42,877	2%
	Fuel Oils	40,511	2%
	Man-made fibers and plastics basic shapes and articles	29,422	1%

Table 4-12 Top Ten Exports by Tonnage and County

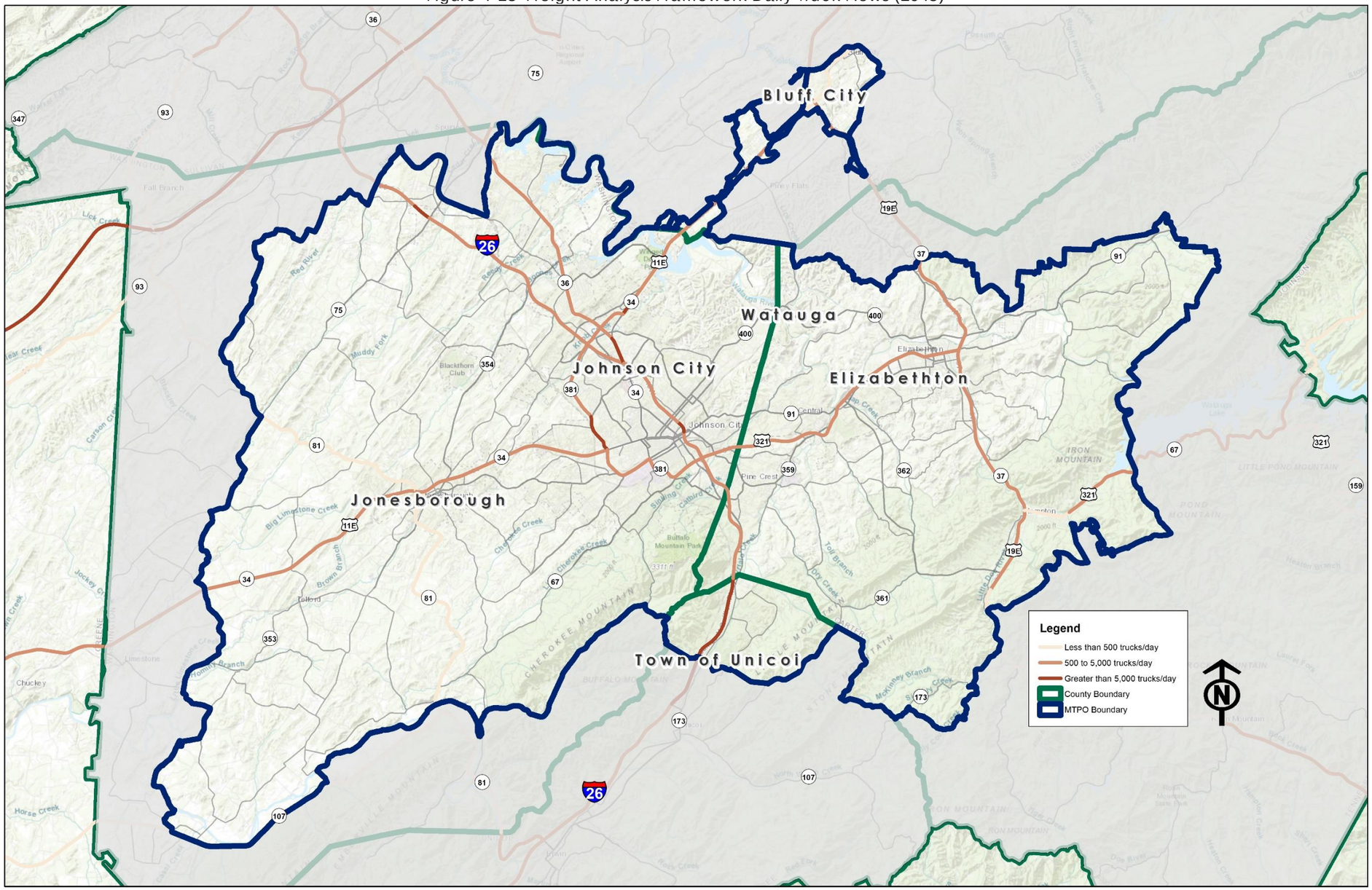
	Commodity	Tons	Percent of County
Carter	Monumental or Building Stone	33,395	16%
	Non-metallic waste and scrap, except from food processing	32,059	15%
	Fresh or chilled edible vegetables and dried vegetables	18,747	9%
	Other non-metallic mineral products	16,567	8%
	Miscellaneous manufactured products	11,858	6%
	Paper or Paperboard Articles	10,206	5%
	Structures and parts, except prefabricated buildings	8,920	4%
	Dolomite	8,145	4%
	Fresh-cut flowers, plants, and parts of plants, and other agricultural products	6,537	3%
	Other wood products	5,435	3%
Sullivan	Gravel and Crushed Stone	1,608,420	30%
	Organic chemicals	810,998	15%
	Glass and glass products	314,199	6%
	Essential oils and resinoids, and perfumery, cosmetic, or toilet preparations	251,937	5%
	Other chemical products and preparations	242,095	5%
	Man-made fibers and plastics basic shapes and articles	176,782	3%
	Phenols, phenol-alcohols, aldehydes, cyclic polymers of aldehydes, paraformaldehyde, ketones, quinones, organic acids, and acyclic alcohols	173,988	3%
	Other non-metallic mineral products	163,311	3%
	Plastics in primary forms, rubber in primary forms or sheets, and unvulcanized compounded rubber	150,975	3%
	Non-metallic waste and scrap, except from food processing	136,008	3%
Unicoi	Rubber articles	19,613	14%
	Non-metallic waste and scrap, except from food processing	16,221	12%
	Electric motors, generators, generating sets, rotary converters, transformers, static converters, and inductors	15,288	11%
	Monumental or Building Stone	14,517	11%
	Essential oils and resinoids, and perfumery, cosmetic, or toilet preparations	13,318	10%
	Other chemical products and preparations	12,713	9%
	Metallic waste and scrap	5,973	4%
	Inorganic chemicals	5,139	4%
	Man-made fibers and plastics basic shapes and articles	3,994	3%
	Fresh or chilled edible vegetables and dried vegetables	3,643	3%
Washington	Non-metallic waste and scrap, except from food processing	154,382	12%
	Other non-metallic mineral products	115,136	9%
	Gasoline	102,196	8%
	Fresh or chilled edible vegetables and dried vegetables	92,218	7%
	Metallic waste and scrap	80,283	6%
	Non-alcoholic beverages and ice	69,950	5%
	Fuel Oils	47,333	4%
	Other machinery	34,612	3%
	Other wood products	33,265	3%
	Fresh-cut flowers, plants, and parts of plants, and other agricultural products	32,229	2%

Table 4-13 Top Five Origins and Destinations by BEA, Tonnage, and County

	Imports			Exports		
	BEA	Tons	Percent of County	BEA	Tons	Percent of County
Carter	Lexington, KY	256,124	22%	Hickory, NC	45,750	22%
	Hickory, NC	241,291	20%	Johnson City, TN	42,531	20%
	Asheville, NC	178,990	15%	Lexington, KY	39,600	19%
	Johnson City, TN	157,271	13%	Asheville, NC	31,598	15%
	Huntsville, AL	41,107	3%	Huntsville, AL	7,185	3%
Sullivan	Lexington, KY	1,912,714	21%	Johnson City, TN	1,444,133	27%
	Johnson City, TN	1,764,406	19%	Asheville, NC	823,497	15%
	Asheville, NC	1,229,479	14%	Lexington, KY	752,215	14%
	Huntsville, AL	731,961	8%	Huntsville, AL	638,659	12%
	Hickory, NC	701,838	8%	Hickory, NC	470,320	9%
Unicoi	Asheville, NC	46,109	18%	Lexington, KY	27,769	20%
	Lexington, KY	41,982	16%	Johnson City, TN	27,002	20%
	Johnson City, TN	32,915	13%	Asheville, NC	26,831	20%
	Huntsville, AL	16,171	6%	Memphis, TN	9,649	7%
	Hickory, NC	11,231	4%	Hickory, NC	9,061	7%
Washington	Lexington, KY	413,104	19%	Lexington, KY	219,470	17%
	Hickory, NC	344,739	16%	Asheville, NC	195,051	15%
	Asheville, NC	335,332	15%	Johnson City, TN	192,730	15%
	Johnson City, TN	297,594	14%	Hickory, NC	190,838	15%
	Huntsville, AL	94,809	4%	Huntsville, AL	41,759	3%

Figure 4-13 illustrates daily commercial vehicle truck flows (e.g. semi-trucks) through the MTPO planning area based on FHWA's Freight Analysis Framework (FAF4) data for the year 2045. As illustrated in the figure, the transport of goods to and from the region is projected to increase with the greatest volume of truck traffic occurring along I-26 in Washington and Carter Counties and along routes such as State of Franklin Road and North Roan Street in Johnson City.

Figure 4-13 Freight Analysis Framework Daily Truck Flows (2045)



Intermodal Connections

In total, 76 major freight businesses and freight generating facilities were identified within the MTPO area, with American Water Heater Company being one of the largest. Most of these facilities are located along roadways with direct access to a major highway and/or rail line. Figure 4-14 illustrates the existing transportation system – rail, air, and truck that serve the area. A major determinant of current and future freight movement patterns is the location of industrial employers. The key to achieving greater efficiency in freight movement is the placement of these sites relative to existing transportation infrastructure. Figure 4-15 illustrates areas of industrial use within the MTPO area and how these locations are served by the various transportation systems.

As depicted in Figure 4-15, industrial use concentrations are mostly located near the existing railroad in Johnson City, near interchanges along I-26, and along SR 400 in Johnson City and SR 91 in Elizabethton. Ensuring that uses are compatible and strategically placed improves the intermodal exchange of goods and helps to reduce costs in transport – both directly and indirectly.

Future Conditions

As discussed in earlier sections of this plan, the Johnson City area has a diverse transportation system that is conducive to the movement of goods and services. The recommended improvements of this plan illustrate considerable benefits across and between modes, and to each respective transportation system.

Numerous improvements to the transportation system over the planning horizon, such as interchange improvements to I-26, the widening of SR 354, the construction of the Jonesborough Parkway, safety improvements for SR 75 and SR 81, along with the deployment of intelligent transportation systems (ITS) technologies are intended to ensure adequate capacity and connectivity within the transportation system relative to transporting goods. These projects, along with other improvements within the plan, are intended to facilitate greater opportunities for the movement of goods and services within and through the MTPO area. Implementing the recommendations of the plan is key to this objective and the region's long term economic vitality.

Knowing that many of these improvements are located on Interstate and other State-owned facilities, and the nature of goods movement across Tennessee, the MTPO has been an active participant in the State's freight planning processes through its involvement in the Freight Advisory Committee (FAC). In 2013, TDOT developed a Statewide Multimodal Freight Plan; during that process, the MTPO provided data and project needs for the region. As part of the 2017 update to that plan, the MTPO provided recommendations on Critical Freight Corridors for the region and assisted in the determination of scoring criteria for these corridors statewide. Data used throughout these efforts is consistent with freight data utilized in the development of this MTP, creating a strong link between the State's and MTPO's freight planning processes.

Figure 4-14 Air, Rail & Truck Facilities

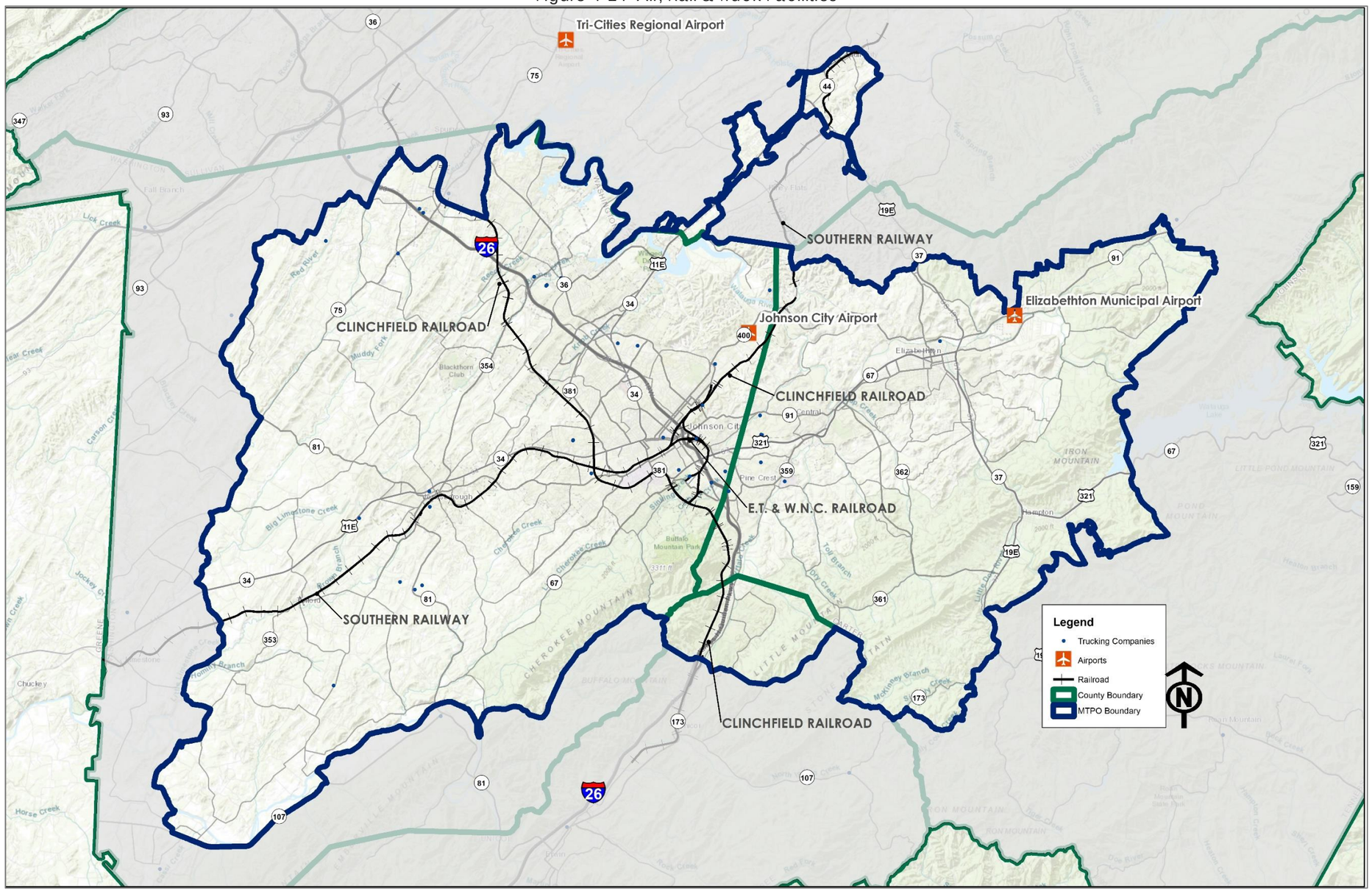
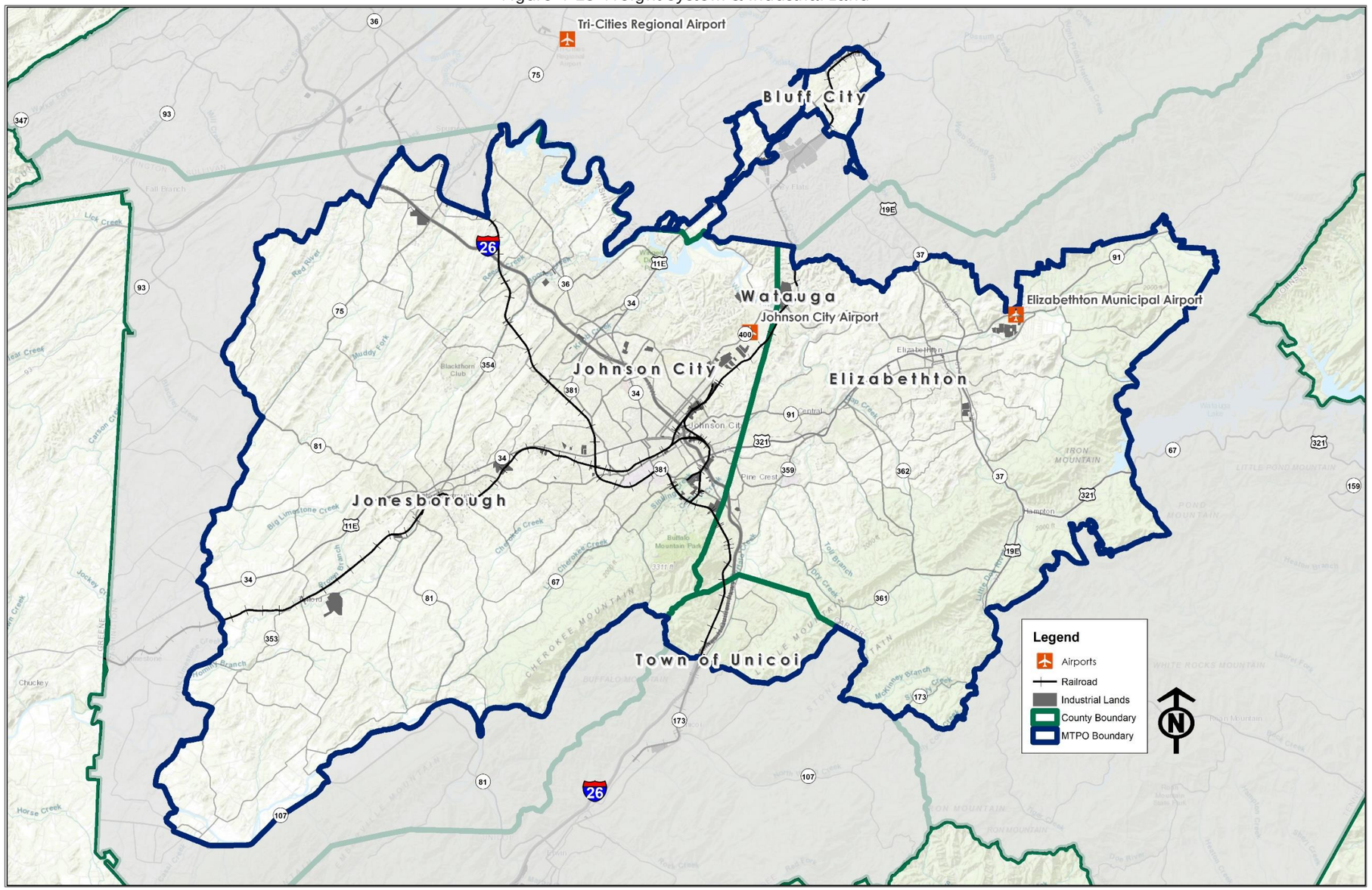


Figure 4-15 Freight System & Industrial Land



4.5 TECHNOLOGY AND TRANSPORTATION

Intelligent Transportation Systems (ITS) refers to use of technological innovation to manage the existing transportation system more effectively, improve its efficiency, and to make the system more user friendly. A wide variety of ITS technologies are under development or are being used in cities and towns throughout the US and internationally, ranging from motorist message signs to automatic vehicle locator (AVL) systems on transit vehicles.

In order to be eligible for federal transportation funding, regions must show that their ITS projects conform to a regional ITS architecture. ITS architectures provide a framework for implementing ITS projects, encourage interoperability and resource sharing among agencies, identify applicable standards to apply to projects, and allow for cohesive long-range planning among regional stakeholders. The requirement for a regional ITS architecture was first established in 1998 by the Transportation Equity Act for the 21st Century, and implemented in 2001 by the Federal Highway Administration's and Federal Transit Administration's policy on the National ITS Architecture. This requirement is continued under the FAST Act.

The Johnson City Regional Intelligent Transportation System Architecture was updated in 2015 to organize the implementation of ITS technologies in the Johnson City region. The primary goals of the architecture were to steer the creation of a functional ITS program that satisfies the demands of local and regional transportation stakeholders and to formulate a realistic vision for the future of Johnson City's ITS network.

In development of the Johnson City ITS architecture, eight local, regional, state, and federal stakeholders, including the MTPO, were consulted for input and assistance in defining the operation of the Johnson City networks. The Johnson City ITS stakeholders included:

- City of Elizabethton – Public Works
- City of Johnson City - Public Works
- FHWA – Tennessee Division
- First Tennessee Development District
- Washington County EMA
- TDOT – Region 1 Traffic
- TDOT – Long Range Planning Division
- Johnson City MTPO
- Johnson City Transit
- Carter County Emergency Management Agency (EMA)

The Johnson City ITS Architecture contains 40 of the 97 market packages defined in the National ITS Architecture. As part of the Regional ITS Architecture, an ITS Deployment Plan was also developed. The ITS Deployment Plan, while not required by FHWA and FTA, is a useful tool for regions to identify specific projects to be deployed in order to implement the architecture. The ITS Deployment Plan builds on the architecture by outlining specific ITS project recommendations and strategies for the Region as well as identifying deployment timeframes so that the recommended projects and strategies can be implemented over time. Table 4-14 presents a listing of the highest priority ITS projects for the Johnson City Region, some of which have been recently implemented, and/or are currently under development:

Table 4-14 Johnson City Regional ITS Architecture Recommendations

Project	Project Description	Deployment Timeframe and Responsible Agency	Applicable ITS Service Packages
TDOT SmartView Access for Local Governments	SmartView is a software program that is currently used internally by TDOT to view real-time CCTV camera video in addition to other functions. In the future, this program will allow local government agencies the ability to view TDOT CCTV cameras feeds and offer additional viewing capabilities that are not available to the general public on the SmartWay website. TDOT is currently working with local agencies to obtain signed MOUs regarding access to SmartView and data sharing. Estimated project cost for the SmartView video distribution software and a five year support contract is $3,300,000. The project is funded through State funds.	Short-Term: TDOT and Counties/ Municipalities	ATMS01 – Network Surveillance ATMS07 – Regional Traffic Management
TDOT/Johnson City Coordination	Improve coordination between TDOT and the City of Johnson City, including the exchange of future CCTV camera feeds and improved coordination during incidents.	Short-Term: TDOT & City of Johnson City	ATMS01 – Network Surveillance ATMS07 – Regional Traffic Management ATMS08 – Traffic Incident Management System
Johnson City Paratransit Scheduling	Implement scheduling software for the Johnson City Transit paratransit vehicles. The estimated costs of the project is between $85,000 and $100,000. Approximately $1,900,000 in FTA, state and local funds have been identified for the purchase of paratransit vehicles and technology systems.	Short-Term: Johnson City Transit	APTS01 – Transit Vehicle Tracking APTS03 – Demand Response Transit Operations
City of Johnson City Automatic Vehicle Location (AVL)	Install AVL technology on snowplows to track them during winter weather events.	Short-Term: City of Johnson City	MC01 – Maintenance and Construction Vehicle and Equipment Tracking MC09 – Winter Maintenance
Johnson City Transit Smart Card Implementation	Implement a Smart Card system to pay for Johnson City Transit and NET Trans fares. Card could be expanded to coordinate with other City services.	Short to Mid-Term: Johnson City Transit and NET Trans	APTS04 – Transit Fare Collection Management APTS07 – Multimodal Coordination
Regional Transit Coordination	Improve coordination within and among transit agencies to optimize transit travel times.	Short to Mid-Term: Johnson City Transit and NET Trans	APTS07 – Multimodal Coordination APTS11 – Multimodal Connection Protection
Johnson City Transit Mobile Phone Application	Develop a mobile phone application that allows users to view transit service information, real-time bus location, and create a transit trip plan.	Short to Mid-Term: Johnson City Transit	APTS08 – Transit Traveler Information ATIS02 – Interactive Traveler Information
City of Johnson City CCTV Camera Expansion	Install additional CCTV cameras along major arterials including along Boones Creek Road and in the Gray area in north Washington County. The City currently has $2,330,000 in Federal STP funds for traffic signal improvements, which can include CCTV camera implementation.	Short to Mid-Term: City of Johnson City	ATMS01 – Network Surveillance
City of Johnson City CCTV Camera Video Dissemination	Allow the City of Johnson City Police Department, City of Johnson City Fire Department, TDOT, and other agencies the ability to view CCTV camera feeds.	Short to Mid-Term: City of Johnson City	ATMS01 – Network Surveillance ATMS06 – Traffic Information Dissemination
City of Johnson City Fiber Optic Expansion	Install additional fiber optic cable for traffic signal communications and CCTV camera installation. The City currently has $2,330,000 in Federal STP funds for traffic signal improvements, which can include fiber optic expansion to the signals.	Short to Mid-Term: City of Johnson City	ATMS01 – Network Surveillance ATMS03 – Traffic Signal Control
City of Elizabethton TOC	Connect all traffic signals within the City of Elizabethton to a centralized TOC for operations.	Short to Mid-Term: City of Johnson City	ATMS03 – Traffic Signal Control ATMS07 – Regional Traffic Management
Johnson City Transit Northern Transfer Center	Construct a transfer center in Johnson City Transit's northern service area to serve an expanding population. Transit center could include additional ITS elements such as transit security cameras and bus stop DMS.	Mid-Term: Johnson City Transit	APTS02 – Transit Fixed-Route Operations APTS05 – Transit Security APTS08 – Transit Traveler Information APTS11 – Multimodal Connection Protection
TDOT SmartWay Installation	Install CCTV camera, DMS, and HAR equipment along I-26 and expand the existing infrastructure along I-81.	Mid to Long-Term: TDOT	ATMS01 – Network Surveillance ATMS07 – Regional Traffic ATMS06 – Traffic Information Dissemination
City of Johnson City Adaptive Traffic Signals	Install an adaptive traffic signal system to reduce congestion. This is a system wide improvement. The City currently has a $670,000 in Federal STP funds for this project.	Mid to Long-Term: City of Johnson City	ATMS01 – Network Surveillance ATMS02 – Traffic Probe Surveillance ATMS03 – Traffic Signal Control
City of Johnson City Speed Monitoring System	Collect and disseminate travel time information along major corridors using Bluetooth technology.	Mid to Long-Term: City of Johnson City	ATMS02 – Traffic Probe Surveillance ATMS06 – Traffic Information Dissemination
City of Johnson City Flood Detection and Warning System	Implement a system to provide automated flood detection, road closure, and advanced warning on roads with low water crossings that frequently flood.	Mid to Long-Term: City of Johnson City	ATMS06 – Traffic Information Dissemination EM07 – Early Warning System MC03 – Road Weather Data Collection MC04 – Weather Information Processing and Distribution
City of Johnson City DMS	Install permanent dynamic message signs along key corridors to provide motorists with roadway network conditions.	Mid to Long-Term: City of Johnson City	ATMS06 – Traffic Information Dissemination
Johnson City Metropolitan Transportation Planning Organization Data Warehouse Implementation	Develop a transportation data warehouse that includes region-wide transportation data gathered from the ITS network and various agencies.	Long-Term: Johnson City MTPO	AD1 – ITS Data Mart AD3 – ITS Virtual Data Warehouse
City of Johnson City RWIS	Install road weather information systems that include field sensors to monitor road weather conditions including ice, snow, and rain.	Long-Term: City of Johnson City	MC03 – Road Weather Data Collection MC04 – Weather Information Processing and Distribution

Source: Johnson City Region Regional ITS Architecture, 2015
Notes: Deployment timeframes include short-term (0-5 years), mid-term (5-10 years), and long-term (10+ years)

The use of ITS technologies will become an increasingly important component of the transportation system within the MTPO area as a means of better managing traffic flow and incidents on heavily traveled roadways, both today and in the future. In some cases, even with long-term roadway capacity improvements, a number of high volume roadways throughout the region will continue to experience peak hour congestion. Roadways such as:

- SR 381 (State of Franklin Rd in Johnson City)
- US 11E (Bristol Highway/Roan St in Johnson City)
- US 11E (West Market St/East Jackson Blvd in Johnson City and Jonesborough)
- SR 36 (Roan St/Kingsport Hwy in Johnson City)
- US 321 (in Johnson City and in the City of Elizabethton)
- I-26 (the corridor and interchanges throughout the region)

will require transportation system management (TSM) solutions and ITS improvements to manage current and future traffic operations within the MTPO area over the planning horizon. The 2045 MTP provides a program approach to funding such solutions as part of the MTPO's Cost Feasible MTP (see Table 5-12) with specific projects selected and implemented through the MTPO's TIP.

4.6 Transportation System Security

Public awareness of both man-made and natural security concerns has increased in the last few decades due to events such as international and domestic terrorist activities, civil unrest, and natural disasters such as Hurricane Ivan causing a rock slide on I-40 in western North Carolina and traffic was diverted to I-26 in northeast Tennessee. The vulnerability of the transportation system and its use in emergency evacuations are issues receiving new attention. Federal requirements include security as a factor to be considered in transportation planning processes at both the metropolitan and statewide levels, stating that the planning process should provide for consideration and implementation of projects, strategies, and services that will increase the security of the transportation system for motorized and non-motorized users.

Transportation system security can be defined as the freedom from intentional harm and tampering that affects both motorized and non-motorized travelers, as well as natural disasters. Security goes beyond safety and includes the planning to prevent, manage, or respond to threats of a region and its transportation system and users. Though the MTPO is often not involved in specific security or emergency planning activities, the MTPO does communicate with state and local emergency management and law enforcement agencies, local engineering officials, and emergency personnel on major transportation plans and projects with the intention of developing a transportation system that is as secure as possible. An example of this can be seen in the MTPO's recent efforts in 2015 in planning for ITS technologies within the region. The MTPO's Regional ITS architecture helps to ensure that the planned ITS projects will be implemented with specific protocols and standards that allow for complete ITS interoperability. The architecture ensures that all agencies involved in transportation (emergency responders, law enforcement, transit agencies, local and regional transportation agencies) have the ability to share resources

and information to better manage the overall daily operations of the transportation system.

Additionally, the implementation of ITS technologies is more than an ability to reduce congestion or respond to a traffic incident. ITS technologies provide enhanced management and operations of transportation facilities and often include surveillance equipment to monitor roadways for congestion and incidents; variable message signs that display traffic information to motorists; vehicle detection devices that report traffic counts, speed, and travel time; and motorist service patrols that respond to incidents in a timely manner. These technologies are equally important in providing a secure transportation system.

At many levels, ITS elements can have significant benefits in the event of an emergency. One example is Tennessee's 511 traveler information system. The 511 traveler information system allows travelers to dial "511" on their cell phone and get real-time travel information for most of the major roadways in Tennessee. This system can be used in the event of an emergency to disperse road closure and detour information as well as alternate route information to travelers, thus helping avoid further incident-related congestion. Tennessee also utilizes the SmartWay web map as a visual extension of 511. SmartWay also integrates data from Waze, a community-based traffic mobile app

Local transit agencies have always placed an emphasis on providing a safe, secure, and reliable service for its passengers and employees. These efforts are continuing and are an integral part of providing transit service. While transit must be concerned about safety and security as it relates to the provision of service, transit itself can be a valuable resource to a community in providing rescue or evacuation services. Local transit providers can participate as part of the larger community emergency preparedness efforts.

Lastly, each county within the MTPO has a multi-jurisdictional emergency operation plan and/or equivalent hazard mitigation plan that includes measures for homeland security factors for the region. These documents identify various potential man-made and natural hazards that could occur in the region and identify agency responsibilities in the event of an incident. Locally, the MTPO has attended meetings and provided input in the development of mitigation plans. Typically, the content of a hazard mitigation plan provides a risk and vulnerability assessment and establishes mitigation strategies. TDOT has developed incident response plans for all interstates in Tennessee, including for I-81 and I-26, which define alternate routes if sections of the interstate are closed.

Emergency preparedness and hazard mitigation planning are important elements in providing a safe and secure transportation system. The MTPO is committed to continued participation in these efforts whereby transportation infrastructure and transportation decisions play an important role in protecting human life.

4.7 Public and Stakeholder Engagement

Public and stakeholder input are critical components of the MTPO planning process and are required by federal law. The public and stakeholder involvement process of the 2045

MTP consisted of a variety of communication and outreach means. The primary means of engagement largely consisted of presentations to the MTPO Board, public and stakeholder meetings, the use of an online survey, an online mapping application, and internet and social media outreach. The following depict the various means of each in this process.

Public and Community Meetings

In addition to events listed above, the MTPO also engaged the public and community in a number of venues throughout the region during the development of the 2045 MTP. The following highlights public and community outreach meetings and events held during the development of the 2045 MTP:

- Washington County/Johnson City Area Planning Meeting
  Johnson City Commission Chamber
  June 26, 2017
  4:00 pm – 6:00 pm
- Carter County/Elizabethton Area Planning Meeting
  Elizabethton City Council Chamber
  June 26, 2017
  11:00 am – 1:00 pm

The purpose of these meetings was to present an overview of the MTPO, the MTPO planning process including the development of the 2045 MTP, and solicit input. Of the participants in attendance at the meeting, general input themes included a call for increased safety, greater consideration of walking and biking needs as well as transit services, and addressing traffic operational issues at known high volume locations. Meeting notices were published in both English and Spanish in an effort to reach the Hispanic and Latino communities in the MTPO area. The MTPO website utilizes Google Translate to accommodate a varied of languages.

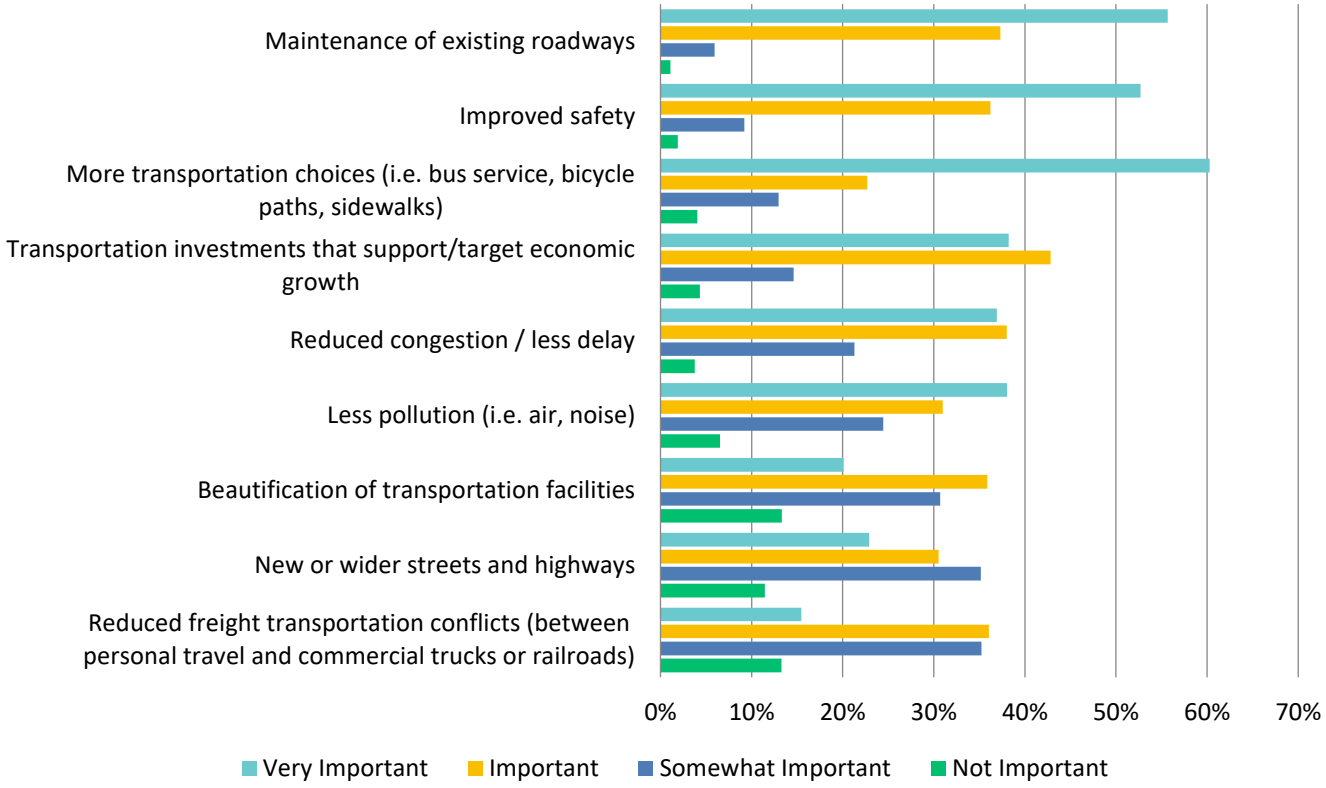
An additional public meeting was held on January 11, 2018 to solicit public feedback on the Draft 2045 MTP. Appendix I contains copies of the meeting notices, sign-in sheets, and other meeting materials from these meetings.

Online Public Survey and Mapping Application

In developing the 2045 MTP, an online survey was created in order to afford individuals an additional opportunity to share their thoughts and opinions on transportation needs within the region. The MTPO website, email, and Twitter were used to promote an online survey and mapping application as well as display ongoing information regarding opportunities for public input. A press release was also issued to promote the survey and local media ran stories about the project. The online survey was created in order to afford individuals an opportunity to share their thoughts and opinions on transportation needs within the region. The online mapping application, Wikimaps, was made available so that residents and stakeholders could provide site-specific information on transportation needs using a map interface. This tool also allowed participants to categorize their comments as they related to emphasis areas such as safety, congestion, maintenance, bicycle and pedestrian, freight and economic development, and others.

A total of 385 individuals participated in the online survey. From the online survey, the MTPO was able to gather specific public input that lead to plan recommendations. The following highlights key findings of the online survey. Key findings from the survey revealed strong support for increased maintenance of existing facilities, improved safety, and additional transportation choices. Figure 4-16 illustrates the top transportation priorities in the region identified by survey participants.

Figure 4-16 Top Transportation Priorities for the Johnson City Area



Stakeholder Meetings & Events

Consultation with stakeholders within the MTPO region, including local and regional planning agencies, transit operators, and various state and federal agencies, as defined in the MTPO's Public Participation Plan (PPP) was also conducted in the development of the 2045 MTP. Specific meetings held with stakeholders occurred on the following dates:

- September 26, 2016 (Project Kick-Off Meeting)
- March 17, 2107 (Land Use/Growth Allocation Meetings)

General items discussed with these stakeholders included:

- Planning Assumptions including Growth and Development (e.g. land use, transportation, population, employment, revenues and funding, etc.)
- Plans, Programs, Projects, and Policies

- Regional Goals and Objectives
- Current and Future Transportation Issues and Solutions

Appendix I contains copies of the agendas, sign-in sheets, and other meeting materials from these stakeholder meetings. In addition to these formal meetings, numerous other means of communication were held with various stakeholders (e.g. TDOT, etc.) throughout the process. A final step in the consultation process included sending a special invitation letter to stakeholders defined within the MTPO's PPP soliciting comments on the MTPO's proposed draft 2045 MTP.

MTPO Board Presentations

Presentations were made to the MTPO Board throughout the development of the 2045 MTP. Project status updates and presentations on the development of the 2045 MTP were made to the MTPO Board at the following public meetings:

- March 17, 2017
- August 18, 2017
- September 14, 2017
- December 21, 2017

Media Outreach

Local news media (print and live) were approached to help disseminate information about the project and the upcoming meetings. Additionally, the use of the internet and other social media were also used to increase awareness on the development of the 2045 MTP. The following lists the variety of methods employed by the MTPO in development of the 2045 MTP:

- Johnson City MTPO Twitter – 302 Followers, multiple tweets announcing MTPO Board meetings where MTP information was presented, stakeholder and public meetings, announcing opportunities for additional public input.
- Online Survey for MTP Update available from the MTPO website main page http://www.jcmpo.org or by direct link https://www.surveymonkey.com/r/2045MTPlan
- Advertisements were posted in the Johnson City Press along with a number of press releases and cover stories as well as news interviews.

Disposition of Comments

A wide range of public comments were provided as part of the development of the MTP. Comments received were given careful consideration during the development of the 2045 MTP. Public comments can be found in Appendix I with the documentation of public involvement.

5 PROGRAMMING OF PRIORITIZED INVESTMENTS

The ability to maintain, improve and enhance transportation facilities and services in the MTPO area depends on adequate financial resources. This section includes:

- A description of the various revenue sources available to the MTPO for transportation-related improvements;
- A summary of the MTPO area's historic transportation revenue trends; and
- A forecast of future years' anticipated revenue for the MTPO region over the planning horizon.

The section concludes with a demonstration of fiscal constraint (i.e. demonstrating that transportation operations, maintenance, and recommended capital improvements can be afforded and adequately maintained into the future).

Financial assumptions of the MTP were developed in consultation with the Tennessee Department of Transportation; the municipalities of Johnson City, Elizabethton, Jonesborough, Bluff City, Watauga, and the Town of Unicoi; and Carter, Sullivan, Washington, and Unicoi Counties; and JCT and NET Trans. Revenue forecasts were developed based on historical funding levels and anticipated future inflationary factors. To account for anticipated future funding increases, an annual inflation factor of 3% was applied to each future year (2020 through 2045).

5.1 OVERVIEW OF FUNDING SOURCES

Funding for transportation facilities and services comes from a variety of sources – federal, state, local, and private. This subsection provides a brief description of the funding sources and categories that are available for transportation expenditures within the MTPO area.

Federal

There are a variety of federal transportation funds available to MTPO areas. This list is not all-inclusive, but serves to highlight the major Federal funding categories. General rules for the funding ratio of projects by type of funding program are also provided (percent of Federal compared to percent of state or local funds). This table is intended to be used only as a general guide, as there are situations where the funding ratios may vary depending on the particular details of the project (see 23 USC 120 for reference in these situations).

Table 5-1 provides a summary of the funding categories. It is important to note that many of the previously used funding programs were eliminated under MAP-21.

Table 5-1 Federal Transportation Funding Programs

Federal Programs	Description	Funding Ratio
Appalachian Development Highway System (APD)	Provides funding for routes with remaining work deemed eligible as approved by the Appalachian Regional Commission in the most recent APD Cost Estimate. This funding program was eliminated under MAP-21. The FAST Act continues that precedent with the elimination of a standalone funding category for APD. APD projects may be eligible for FAST Act STBG and NHPP funds.	100% Federal or 80% Federal, 20% Non-Federal
Bridge Replacement and Rehabilitation State & Local (BRR or BR)	State - Provides funding for on-system bridge replacement, or to rehabilitate aging or substandard bridges based on bridge sufficiency ratings. Local - Provides funding for off-system bridge replacement, or to rehabilitate aging or substandard bridges based on bridge sufficiency ratings.	80% Federal, 20% Non-Federal
Congestion Mitigation and Air Quality Improvement Program (CMAQ)	Provides funding for transportation projects in air quality non-attainment or maintenance areas. CMAQ projects are designed to contribute toward meeting the national ambient air quality standards.	80% Federal, 20% Non-Federal
Federal Lands Transportation Program (FLTP) and Federal Lands Access Program (FLAP)/Forest Highway/Public Lands or Public Lands Highways Discretionary (FH/PL or PLHD)*	Provides funding for projects on Federal Lands Access Transportation Facilities that are located on, adjacent to, or that provide access to Federal lands. A Federal Lands access transportation facility is defined as a public highway, road, bridge, trail, or transit system that is located on, adjacent to, or provides access to Federal lands for which title or maintenance responsibility is vested in a State, county, town, township, tribal, municipal, or local government.	100% Federal or 80% Federal, 20% Non-Federal
High Priority Projects Set Aside of SAFETEA-LU (HPP)*	Provides designated funding for specific projects identified by Congress. This program was discontinued by MAP-21 though some funding has yet to be spent.	80% Federal, 20% Non-Federal
Highway Safety Improvement Program (HSIP)	Provides funding to be used for safety projects that are consistent with the State's Strategic Highway Safety Plan (SHSP) and that correct or improve a hazardous road location or feature or address a highway safety problem.	90% Federal, 10% Non-Federal
Local - Surface Transportation Block Group Program (L-STBG)	Provides funding to areas of 5,000 to 200,000 in population for improvements on routes functionally classified urban collectors or higher.	80% Federal, 20% Non-Federal

* Discretionary funding programs whereby project funding is determined by Congress

Table 5-1 (cont.)

Federal Programs	Description	Funding Ratio
National Highway Freight Program (NHFP)	Provides funding to improve the efficient movement of freight on the National Highway Freight Network (NHFN) and support several goals laid out in the FAST Act.	90% Federal, 10% Non-Federal
National Highway Performance Program (NHPP)	Provides support for the condition and performance of the National Highway System (NHS), for the construction of new facilities on the NHS, and to ensure that investments of Federal-aid funds in highway construction are directed to support progress toward the achievement of performance targets established in a State's asset management plan for the NHS.	80% Federal, 20% Non-Federal
Section 154 Open Container Provision	Funds transferred from a State's Federal-aid highway construction apportionment due to failure to enact and enforce a conforming "open container" law. Funds to be used for alcohol-impaired driving countermeasures or the enforcement of driving while intoxicated laws, or funds for hazard elimination activities under 23 U.S.C. 152.	100% Federal
Surface Transportation Block Group Program (STBG) (also known as S-STBG when programed by TDOT)	Provides funding for to preserve and improve the conditions and performance on any Federal-aid highway, bridge and tunnel projects on any public road, pedestrian and bicycle infrastructure, and transit capital projects, including intercity bus terminals. STBG projects may not be located on local or rural minor collectors. Projects previously authorized under the Recreational Trails (RTP), Safe Routes to School (SRTS), and Transportation Alternatives programs (TAP) are now eligible under the STBG program.	80% Federal, 20% Non-Federal
Transportation Enhancement Set Aside of the STP (TE/ENH) / Transportation Alternatives Program (TAP) from the STBG Program	Provides funding for a set of exclusive activities such as pedestrian facilities, rehabilitation and restoration of historic transportation related structures, and environmental mitigation to address water pollution due to highway runoff.	80% Federal, 20% Non-Federal
Transportation Investment Generating Economic Recovery (TIGER) Discretionary Grant Program	A highly competitive national grant program administered by the US DOT for capital investments in road, bridge, rail, transit and port projects that promise to achieve national objectives. TIGER Grants may not be less than $5 million and not greater than $25 million, except that for projects located in rural areas the minimum TIGER Discretionary Grant size is $1 million.	80% Federal, 20% Non-Federal 100% Federal (Rural Areas Only)

* Discretionary funding programs whereby project funding is determined by Congress

Table 5-1 (cont.)

Federal Programs	Description	Funding Ratio
FTA Section 5307 (Urbanized Area Formula Grants)	Section 5307 is a formula grant program for urbanized areas for transit capital and operating assistance in urbanized areas and for transportation-related planning. Formula Grants provide funding to urbanized areas for public transportation capital, planning, job access and reverse commute projects, as well as transit operating assistance. For urbanized areas with populations less than 200,000, operating assistance is an eligible expense. For urbanized areas of 200,000 or more funds for operating assistance may not be used unless identified by FTA as eligible under the Special Rule.	80% Federal, 20% Non-Federal (Capital) 50% Federal, 50% Non-Federal (Operating)
FTA Section 5309 (Capital Investment)*	Provides funding for major transit capital investments, including heavy rail, commuter rail, light rail, streetcars, and bus rapid transit.	80% Federal, 20% Non-Federal
FTA Section 5310 (Enhanced Mobility of Seniors and Individuals with Disabilities)	This program provides transit capital and operating assistance, through the state, to private non-profit organizations and public bodies that provide specialized transportation services to elderly and/or persons with disabilities.	80% Federal, 20% Non-Federal (Capital) 50% Federal, 50% Non-Federal (Operating)
FTA Section 5339 (Buses and Bus Facilities)	This program provides for capital funding to replace, rehabilitate and purchase buses, vans, and related equipment and to construct bus related facilities including technological changes or innovations to modify low or no emission vehicles or facilities.	80% Federal, 20% Non-Federal
Airport Improvement Program (AIP)	Provides grants for planning, development, or noise compatibility projects at or associated with individual public-use airports (including heliports and seaplane bases).	Varies – Federal and Non-Federal

* Discretionary funding programs whereby project funding is determined by Congress

State and Local

Within Tennessee, there are a variety of funding sources that provide various levels of funding towards transportation investments within the state. These revenue sources include:

- Gasoline and Diesel Taxes
- Sales and Use Taxes
- Special Petroleum Taxes and Fees
- Property Taxes

- Beer and Liquor Taxes
- Hotel/Motel Taxes
- In Lieu of Tax Payments
- Business Taxes

These funds are used primarily to match the federal programs listed above and fund state DOT functions. Additionally, all local jurisdictions receive at least some transportation funding from the state (i.e., the state shared revenue from state-imposed taxes with local jurisdictions). The largest of these shared taxes is the petroleum tax (gasoline and diesel taxes), which commonly is used by local jurisdictions for transportation. The state also shares various sales taxes with localities, and funds from the other sources, which are usually placed in a jurisdiction's general fund. A large portion of these funds, at the local level, are used by local jurisdictions for their individual transportation needs.

Periodically states undertake taxing initiatives to generate additional state revenues for transportation needs. In 2015, Tennessee began the process of exploring fuel tax changes to increase transportation revenues for the state as well as cities and counties within Tennessee. Tennessee's 110th General Assembly was presented a comprehensive transportation funding initiative known as the IMPROVE Act (Improving Manufacturing, Public Roads, and Opportunities for a Vibrant Economy), the first significant update to Tennessee's transportation funding program since 1989.

Key aspects of the IMPROVE Act include:

- Increasing the road user fee for gas and diesel.
- Increasing car registration fees.
- Placing an annual fee on electric vehicles and increasing charges on vehicles using alternative fuels.
- Allow certain local governments to levy a local option transit surcharge on local privilege taxes to help fund public transit systems.

Overall, the IMPROVE Act brings in new dollars annually to fund 962 transportation projects across all 95 counties, with 52% of the projects going to urban areas and 48% to rural areas. These projects include safety and interstate improvements, congestion reduction, economic corridors, and repairing 536 bridges statewide. Additionally, dollars will be provided to cities and counties for local transportation projects as well as the creation of several grant programs for transit administered by TDOT.

For the Johnson City MTPO area, the IMPROVE Act translates into approximately $103,002,000 in projects (28 projects in total) and a projected increase in state-aid highway funds to local municipalities within the MTPO area. Of the 28 projects, three are projects that are currently under development as shown on Table 4-2 of the 2045 MTP. The remaining 25 projects (1 roadway and 24 bridges) are accounted for in the MTPO's fiscally constrained portion of the MTP.

Lastly, through IMPROVE Act and other state funding, TDOT offers two transit related funding programs – TDOT Critical Trips Program (CRIT) and IMPROVE Act Capital Grants. The CRIT program provides operating assistance to support demand response service in urban fringe areas of Tennessee not served by a primary urban transit system. Annual

program funds are approved by the State Legislature and allocated to pre-determined public transportation providers by formula. In the Tri-Cities region, NET Trans is the recipient of these funds, which totals just over $213,000 of state funds annually and requires an equal match of local funds.

The IMPROVE Act Capital Grant program is a competitive grant program that allows transit providers of FTA 5307 and FTA 5311 to seek up to $3 million of funding annually for a variety of capital projects. Eligible projects under this program include transit centers, administration, maintenance and storage facilities, stations, park and ride lots, ITS and technologies, passenger amenity projects, fueling and charging stations, rolling stock and associate equipment, and safety and security equipment. Currently, TDOT is projecting $13 million in 2018, $17 million in 2019, and $21 million in 2020 and beyond for this statewide program. As with the CRIT program, these funding levels are contingent upon approval of TDOT's budget by the Tennessee General Assembly and Governor.

Other Potential Funding Options

While not considered part of the 2045 MTP Financial Plan, other regions are exploring the following funding options in meeting their transportation funding needs which may be worth considering in the Johnson City MTPO area:

- Creation and use of tax increment financing and capital improvement district funds for targeted areas within the region
- Creation and use of local adequacy fees which some communities in Tennessee use to offset development infrastructure costs

5.2 Historic Transportation Revenue Trends

Historic funding trends provide a reasonable foundation for estimating likely future funding levels over the planning horizon in the MTPO area. As previously described, numerous revenue sources provide funding for transportation in the MTPO area. These revenue sources have, and continue to provide, a steady stream of funding for transportation infrastructure and services in the MTPO area.

Appendix I provides documentation of the review and development of the 2045 MTP revenue forecasts for the MTP Financial Plan.

5.3 Funding Forecast

Historic revenue trends provide a foundation for making realistic projections on potential future funding. This subsection provides a projection of likely funds available for transportation in the MTPO area over the plan horizon based on historic trends. Assumptions on available revenues and assumptions on likely increases in revenues over time were derived by reviewing historic funding levels from the revenue sources presented in subsections 5.1. Additionally, the MTPO reviewed various tax revenue publications from the State of Tennessee. This information, coupled with discussions with TDOT, JCT, and NET Trans, resulted in the revenue assumptions and likely annual increases in revenues over the planning horizon for the MTPO region.

Streets and Highways

Historic funding trends for streets and highways operations and maintenance and capital investments from all previously discussed funding sources over the planning horizon resulted in an availability of:

- $ 1,604,588,000 for operating/maintenance funds, and
- $ 543,780,000 for capital investments.

Operating and maintaining existing infrastructure is a sizable portion of the overall transportation budget accounting for nearly 75% of funds available for all streets and highway funds. The expense of maintaining the current transportation system is typically shared between state and local governments. State highway maintenance funds are provided through the Tennessee Department of Transportation for items such as pavement markings, signage, resurfacing, snow removal, and minor repairs.

Local governments provide a substantial amount of equipment and manpower to maintain local streets and roads, including some state routes. Local government budgets specify funding through public works departments for maintaining streets in a variety of activities, including resurfacing, cleaning, right-of-way mowing, litter control, signage, pavement markings, snow removal, and others.

Beyond the MTPO's 2017-2020 TIP, a conservative 3% compounded annual growth rate was assumed for revenue calculations from 2020 to 2045. Table 5-2 and Table 5-3 illustrate the funding availability by horizon year for streets and highways within the MTPO area and include federal, state, and local revenues. Since projections of operations and maintenance funding is largely derived from historic revenues, revenue assumptions for operations and maintenance at this time do not reflect increased dollars that would come to the MTPO area from the IMPROVE Act. Over time, these increased revenues would be reflected in the MTPO's future MTPs.

Table 5-2 2045 Streets & Highways Operating and Maintenance Funding Forecast

Revenue Source	Annual Average [1]	Inflation Factor [2]	Revenue Projections		
			2025 Horizon Year	2045 Horizon Year	Total 2020-2045
City of Bluff City - State & Local Gas/State Aid Funds	$225,000	1.03	$1,499,000	$7,436,000	$8,935,000
City of Elizabethton - State & Local Gas/State Aid Funds	$2,159,000	1.03	$14,384,000	$71,349,000	$85,733,000
City of Johnson City - State & Local Gas/State Aid Funds	$9,624,000	1.03	$64,120,000	$318,046,000	$382,166,000
Town of Jonesborough - State & Local Gas/State Aid Funds	$685,000	1.03	$4,564,000	$22,637,000	$27,201,000
Town of Unicoi - State & Local Gas/State Aid Funds	$404,000	1.03	$2,692,000	$13,351,000	$16,043,000
City of Watauga - State & Local Gas/State Aid Funds	$43,000	1.03	$286,000	$1,421,000	$1,707,000
Carter County - State & Local Gas/State Aid Funds [3]	$3,192,000	1.03	$21,267,000	$105,487,000	$126,754,000
Sullivan County - State & Local Gas/State Aid Funds [3]	$8,034,000	1.03	$53,526,000	$265,501,000	$319,027,000
Unicoi County - State & Local Gas/State Aid Funds [3]	$1,700,000	1.03	$11,326,000	$56,180,000	$67,506,000
Washington County - State & Local Gas/State Aid Funds [3]	$7,144,000	1.03	$47,597,000	$236,089,000	$283,686,000
TDOT (Various State Sources) [4]	$7,198,000	1.03	$47,956,000	$237,874,000	$285,830,000
Total	$40,408,000		$269,217,000	$1,335,371,000	$1,604,588,000

Projections rounded to the nearest thousands
[1] Annual average revenues are based on a review of historic funding levels to the MTPO region
[2] Revenue forecasts assume a 3 percent annual growth rate of funding unless otherwise noted
[3] County maintenance funds shown are for the complete counties of Carter, Sullivan, Washington, and Unicoi Counties
[4] TDOT maintenance funds shown are for state maintained roadways for the complete counties of Carter, Sullivan, Washington, and Unicoi Counties

Table 5-3 2045 Streets & Highways Capital Funding Forecast

Revenue Source	Annual Average [1]			Inflation Factor [2]	Revenue Projections		
	Federal Share	Non-Federal Share	Total		2025 Horizon Year	2045 Horizon Year	Total 2020-2045
National Highway Performance Program (NHPP) Funds (NHS, IM, & portion BRR/BR Funds) - (80%/20%)	$1,300,000	$325,000	$1,625,000	1.03	$10,827,000	$53,702,000	$64,529,000
Surface Transportation Program (S-STBG) Funds (S-STBG & portion of BRR/BR Funds) State Selected Projects - (80%/20%)	$1,000,000	$250,000	$1,250,000	1.03	$8,328,000	$41,309,000	$49,637,000
Highway Safety Improvement Program (HSIP) Funds Safety Funding (90%/10%)	$1,800,000	$200,000	$2,000,000	1.03	$13,325,000	$66,094,000	$79,419,000
Surface Transportation Program (L-STBG) Funds MTPO Selected Projects (80%/20%)	$2,900,000	$725,000	$3,625,000	1.03	$24,151,000	$119,796,000	$143,947,000
Transportation Alternatives (TA) Funds (EHN, RTP, SRTS Funds) (80%/20%)	$200,000	$50,000	$250,000	1.03	$1,666,000	$8,262,000	$9,928,000
Other Federal-Aid Programs & Discretionary Funds (e.g. APD, ARRA, TIGER, INFRA, FLAP, NHFP) (80%/20%)	$400,000	$100,000	$500,000	1.03	$3,331,000	$16,524,000	$19,855,000
State (STA or SP and SPPR) Funds State Selected Projects (100% State)		$250,000	$250,000	1.03	$1,666,000	$8,262,000	$9,928,000
State (IMPROVE ACT) Funds State Funded Projects (100% State) [3]		$17,167,000	$17,167,000	1.00	$92,831,000	$10,171,000	$103,002,000
Local Funding (100% Local)		$1,600,000	$1,600,000	1.03	$10,660,000	$52,875,000	$63,535,000
Total	$7,600,000	$20,667,000	$28,267,000		$166,785,000	$376,995,000	$543,780,000

Projections rounded to the nearest thousands
[1] Based on a review of historic funding levels to the MTPO region
[2] Revenue forecasts assume a 3 percent annual growth rate of funding
[3] Estimated Annual Average revenues are derived from IMPROVE Act totals and are not inflated

Public Transportation

As previously discussed, a variety of transit services are offered throughout the Johnson City MTPO area. These services range from fixed-route and demand-response services in the City of Johnson City to flexible, demand-response service in the rural portions of the MTPO area.

Historic funding trends for transit operating assistance and capital investments from all transit related funding sources resulted in availability over the planning horizon of:

- $160,270,000 for operating assistance; and
- $ 38,439,000 for capital investments.

Beyond the MTPO's 2017-2020 TIP, a conservative 3% compounded annual growth rate was assumed for operating and capital funds from 2020 to 2045.

Table 5-4 and Table 5-5 illustrate the funding availability by transit agency by horizon year for public transportation within the MTPO area. The majority of these funds are associated with urbanized area transit services.

Table 5-4 2045 Public Transportation Operating Funding Forecast

Revenue Source	Annual Average [1]	Inflation Factor [2]	Revenue Projections		
			2025 Horizon Year	2045 Horizon Year	Total 2020-2045
Urbanized Area Services					
Operating Assistance - FTA 5307 (Federal) 50%	$1,665,000	1.03	$11,093,000	$55,024,000	$66,117,000
Operating Assistance - FTA 5307 (Non-Federal March) 50%[3]	$1,665,000	1.03	$11,093,000	$55,024,000	$66,117,000
FTA 5307 Total	$3,330,000		$22,186,000	$110,048,000	$132,234,000
JCT & Other Transit Providers Including NET Trans					
Operating Assistance - Other FTA Programs (Federal) 50%	$140,000	1.03	$933,000	$4,627,000	$5,560,000
Operating Assistance - Other FTA Programs (Non-Federal Match) 50%[3]	$140,000	1.03	$933,000	$4,627,000	$5,560,000
Other FTA Programs (FTA 5310) & Discretionary Funds[4]Total	$280,000		$1,866,000	$9,254,000	$11,120,000
TDOT Critical Trips (CRIT) Program (State) 50% - NET Trans[5]	$213,000	1.03	$1,419,000	$7,039,000	$8,458,000
TDOT Critical Trips (CRIT) Program (Local Match) 50% - NET Trans[5]	$213,000	1.03	$1,419,000	$7,039,000	$8,458,000
TDOT Critical Trips (CRIT) Program Total	$426,000		$2,838,000	$14,078,000	$16,916,000
Total Operating Assistance	$4,036,000		$26,890,000	$133,380,000	$160,270,000

Projections rounded to the nearest thousands

[1] Based on a review of historic funding levels to the MTPO region (MTPO TIPs - FY2008-2011, FY2011-2014, FY2014-2017, and FY2017-2020)

[2] Revenue forecasts assume a 3 percent annual growth rate of funding

[3] Non-Federal match is approximately 25% State and 25% Local based on historic practices

[4] Conservative estimate of FTA funds likely to be available within the MTPO region over the Planning Horizon

[5] Funds are for urban to urban trips in the FTHRA NET Trans service area, which includes Johnson City, Kingsport, and Bristol

Table 5-5 2045 Public Transportation Capital Funding Forecast

Revenue Source	Annual Average [1]	Inflation Factor [2]	Revenue Projections		
			2025 Horizon Year	2045 Horizon Year	Total 2020-2045
Urbanized Area Services					
Capital Assistance - FTA 5307 (Federal) 80%	$160,800	1.03	$1,071,000	$5,314,000	$6,385,000
Capital Assistance - FTA 5307 (Non-Federal Match) 20%	$40,200	1.03	$268,000	$1,328,000	$1,596,000
FTA 5307 Total	$201,000		$1,339,000	$6,642,000	$7,981,000
JCT & Other Transit Providers Including NET Trans					
Capital Assistance - Other FTA Programs (Federal) 80%	$553,600	1.03	$3,688,000	$18,295,000	$21,983,000
Capital Assistance - Other FTA Programs (Non-Federal Match) 20%	$138,400	1.03	$922,000	$4,574,000	$5,496,000
Other FTA Programs (FTA 5310, 5339) & Discretionary Funds [3] Total	$692,000		$4,610,000	$22,869,000	$27,479,000
IMPROVE Act Capital Grants Program (State) 75%	$56,250	1.03	$375,000	$1,859,000	$2,234,000
IMPROVE Act Capital Grants Program (Local Match) 25%	$18,750	1.03	$125,000	$620,000	$745,000
IMPROVE Act Capital Grants Program Total	$75,000		$500,000	$2,479,000	$2,979,000
Total Capital Assistance	$968,000		$6,449,000	$31,990,000	$38,439,000

Projections rounded to the nearest thousands

[1] Based on a review of historic funding levels to the MTPO region (MTPO TIPs - FY2008-2011, FY2011-2014, FY2014-2017, and FY2017-2020)

[2] Revenue forecasts assume a 3 percent annual growth rate of funding

[3] Conservative estimate of FTA funds likely to be available within the MTPO region over the Planning Horizon

Relationship of MTP to the Transportation Improvement Program

As part of the MTPO planning process, the interaction of the MTP with the Transportation Improvement Program (TIP) is important in facilitating a smooth transition, from the planning stages of a project to implementation. The MTP identifies needed transportation improvements over the planning horizon and is used to identify the list of projects for inclusion into the MTPO's TIP. MTPO member governments select these projects, based on funding, schedule, priorities, and citizen input. The TIP thus reflects specific long-range plan projects, according to several factors, including needs, costs, and overall design ensuring adequate mobility in the region is maintained bearing in mind fiscal constraints. The TIP presents a listing of the selected projects scheduled for the next four years. It also presents a more detailed project cost estimate, description of the type of improvements associated with the project, the funding sources and mixture, and the funding amounts for the specific project.

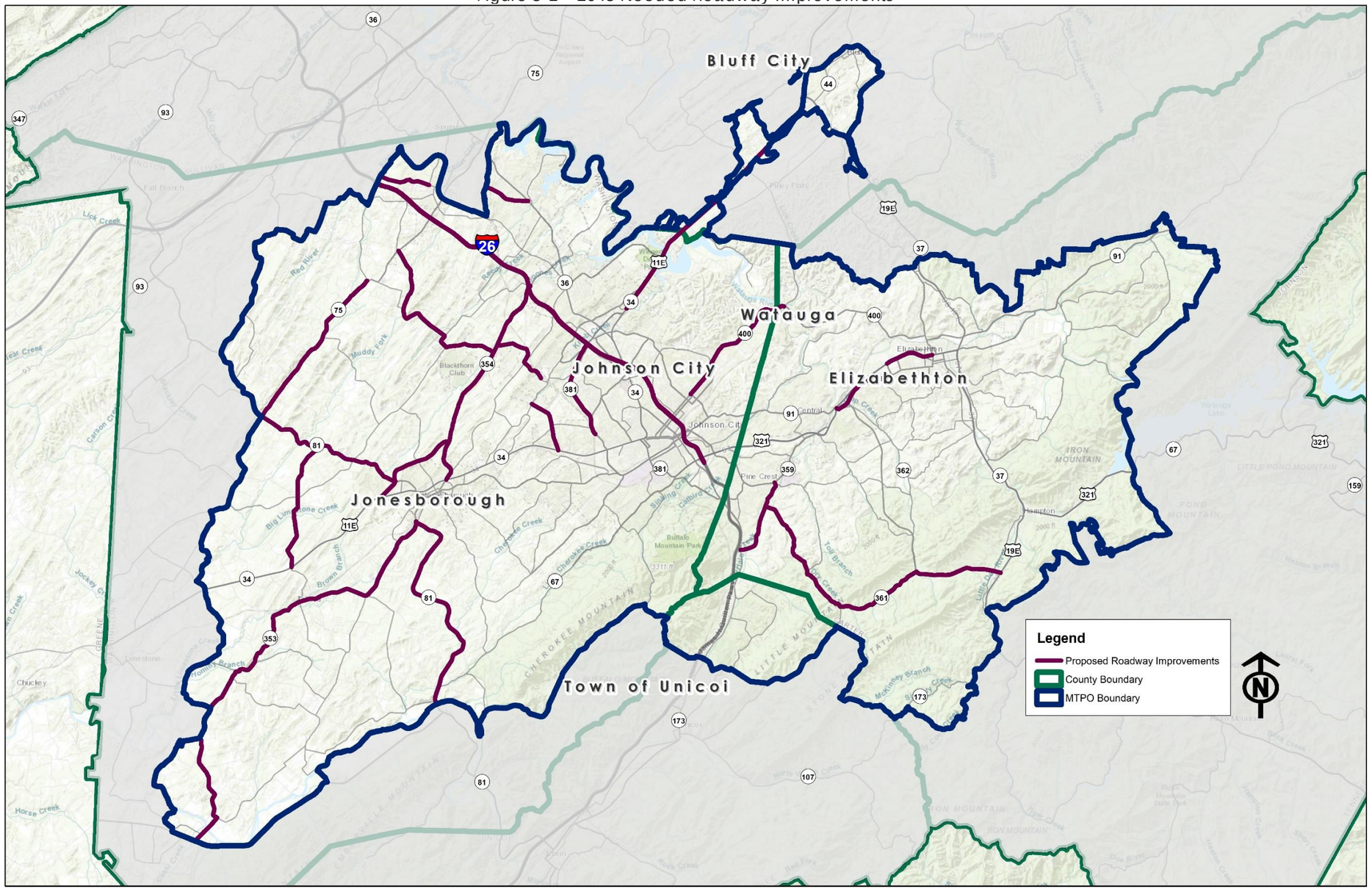
5.4 Identification of Project and Program Needs

This section includes the recommended planned improvements for the Johnson City MTPO area over the planning horizon. Needed transportation improvements were identified based on a review of previous planning efforts, agency involvement, citizen

and stakeholder input, and results from the MTPO's regional travel demand model. Each transportation recommendation was evaluated based on the MTPO's established MTP project selection criteria presented later in this section. This information was then balanced against the MTPO's projected financial revenue availability, which subsequently resulted in the recommended projects of this Plan. Transportation improvements within the recommended plan are financially constrained (i.e. have been balanced against forecasted revenues presented in Section 5.0 of the MTP).

Figure 5-1 provides a visual representation of the improvements needed over the plan horizon within the Johnson City MTPO area. However, all of these improvements cannot be implemented with the anticipated revenues that have been forecasted over the planning horizon. As such, a prioritization process was employed to help determine which projects should be funded with the available revenues.

Figure 5-1 2045 Needed Roadway Improvements



5.5 PROJECT AND PROGRAM SELECTION PROCESS

Each transportation recommendation considered for inclusion in the 2045 MTP was evaluated by comparing the project's need with the stated goals and objectives of the Plan. To create a stronger link between the stated goals and objectives of the 2045 MTP and transportation improvements ultimately selected for funding by the MTPO, the MTPO Executive Board at their September 14, 2017 meeting established evaluation criteria to guide the review and development of projects ultimately selected for inclusion into the 2045 MTP. The following are the criteria and associated points for each project selection criteria, with more detailed descriptions of the criteria provided in Appendix I:

Priority	Measure	Points
Operational Efficiency	Current and future level of service (LOS), traffic operations, traffic volume, system redundancy, and population growth	35 points
Safety	Number of auto and non-auto crashes, crash rate, and geometrics	25 points
Economic	Proximity to freight dependent industries, percentage of trucks, employment growth, and tourist destinations served	15 points
Active Transportation	Proximity to non-motorized trip generators, transit-dependent populations, and proposed non-motorized improvements	15 points
Environmental	Avoidance of floodplains, historical areas, steep slopes, and parks, and capacity projects without widening or adding a new facility	10 points

Each transportation recommendation considered for inclusion in the 2045 MTP was evaluated by comparing the project's need with the above project selection criteria. Appendix IV provides greater detail on each criterion and the results of the assessment that aided in the ultimate selection of the recommended transportation improvements, which are presented earlier in this section.

The resulting score for each project is an indication of the transportation project's consistency with the MTPO's stated goals. The higher the score, the more consistent the project is with the region's desires for transportation investments. Conversely, the lower the score, the less consistent the project is with the region's desires for transportation investments, indicating that the project does not fully meet or achieve all the stated goals and objectives of the MTPO. Table 5-6 and Figure 5-2 shows the fiscally-constrained projects that are to be implemented over the horizon with the forecasted available revenues. Of note is that project costs are projected to a year of expenditure (YOE) for the purposes of meeting fiscal constraint; more information on YOE calculations is provided in Section 5.6. Project costs were developed using TDOT's Project Cost Estimation Tool in conjunction with previous planning cost estimates and local engineering evaluations.

Table 5-6 2045 Fiscally-Constrained Roadway Improvements

2045 MTP #	Jurisdiction	Roadway	From	To	Length Miles	Federal Functional Class	Type of Improvement	Project Description	2017 Costs	YOE Costs	Type	Horizon Year
5	Johnson City	Boones Creek Rd (SR 354)	I-26	Highland Church Rd	2.2	Minor Arterial	Widening	Widen existing 2 lane roadway to 4 lanes	$15,400,000	$31,200,000	S-STBG/ L-STBG	2045
6	Washington Co	Boones Creek Rd (SR 354)	Highland Church Rd	Jonesborough Bypass	2.9	Minor Arterial	Widening	Widen existing 2 lane roadway to 4 lanes	$18,300,000	$37,100,000	S-STBG/ L-STBG	2045
7	Jonesborough	Boones Creek Rd (SR 354)	Jonesborough Bypass	US 11E	1.2	Minor Arterial	Widening	Widen existing 2 lane roadway to 4 lanes	$9,400,000	$19,000,000	S-STBG/ L-STBG	2045
8	Jonesborough	Jonesborough Bypass	Boones Creek Rd (SR 354)	US 11E (Persimmon Ridge Road)	2.7	Proposed Minor Arterial	New Road	Construct new 3 lane roadway	$14,600,000	$17,100,000	L-STBG	2025
9	Johnson City	N. State of Franklin (SR 381)	I-26	Knob Creek Rd	1	Principal Arterial	Widening	Widen existing 4 lane roadway to 6 lanes	$14,400,000	$29,200,000	NHPP	2045
16	Washington Co	Free Hill Rd	Free Hill Rd	Kingsport Hwy (SR 36)	1.6	Proposed Collector	Reconstruction	Reconstruct 2 lane roadway addressing geometric issues	$7,300,000	$14,800,000	Local	2045
17	Johnson City	Knob Creek Rd*	Mizpath Hills Dr	Boones Creek Rd (SR 354)	2	Proposed Collector	Widening	Widen existing 2 lane roadway to 4 lanes	$20,200,000	$23,600,000	IMPROVE	2025
18	Elizabethton	W G St	W Elk Ave (SR 67)	Hudson Dr	2	Minor Arterial	Reconstruction	Reconstruct existing 2 lane roadway to 3 lanes (adding a center turn lane)	$16,000,000	$32,400,000	L-STBG	2045
19	Johnson City	E. Unaka Ave	Broadway St	E Fairview Ave	1.1	Minor Arterial	Reconstruction	Reconstruct existing 2 lane roadway to 3 lanes (adding a center turn lane)	$9,000,000	$18,200,000	STA/ S-STBG	2045
22	Washington Co	Bob Jobe Rd Extension	Ford Creek Rd	Center St	1.5	Proposed Collector	New Road	Construct new 2 lane roadway	$5,600,000	$11,300,000	Local	2045
23	Johnson City	Hopper Rd	W Market St (US 11E)	Indian Ridge Rd	0.7	Proposed Collector	Reconstruction	Reconstruct 2 lane roadway addressing geometric issues to align with Hopper Rd Ext	$4,900,000	$7,900,000	Local	2045
24	Johnson City	Hopper Rd Ext	Indian Ridge Rd	Claude Simmons Rd	1	Proposed Collector	New Road	Construct new 2 lane roadway	$5,800,000	$11,700,000	Local	2045
25	Carter Co	Okolona Rd (SR 359)	I-26	Existing Okolona Rd (SR 359)	0.7	Collector	Realignment	Realign existing roadway with interchange to create better access	$3,900,000	$4,600,000	S-STBG	2025
26	Washington Co	SR 75	Boonesboro Rd	MTPO Planning Boundary (i.e. to US 11E)	12.8	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	$7,700,000	$15,600,000	HSIP	2045
27	Washington Co	SR 81	Jonesborough Bypass	MTPO Planning Boundary (i.e. to I-81)	14.4	Minor Arterial	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	$8,700,000	$17,600,000	HSIP	2045
28	Washington Co	Leesburg Rd	US 11E	SR 81	3.9	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	$2,300,000	$4,700,000	Local	2045
29	Washington Co	SR 353	SR 81	SR 107	13.3	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	$8,000,000	$16,200,000	HSIP	2045
30	Washington Co	SR 81	SR 353	MTPO Planning Boundary (i.e. to I-26)	13.8	Minor Arterial	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	$8,300,000	$16,800,000	S-STBG/HSIP /Disc	2045
31	Carter Co	SR 361	SR 359	US 19E	8.9	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	$5,300,000	$6,200,000	HSIP	2025
32	Carter Co	Okolona Rd (SR 359)	Milligan Hwy (SR 359)	S Roan St	1.6	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	$1,000,000	$1,200,000	STA/ S-STBG/HSIP	2025
33	Washington Co	Highland Church/ Shadden Rd	SR 75	Boones Creek Rd (SR 354)	5.3	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	$3,200,000	$3,700,000	HSIP	2025

Figure 5-2 2045 Fiscally-Constrained Roadway Improvements

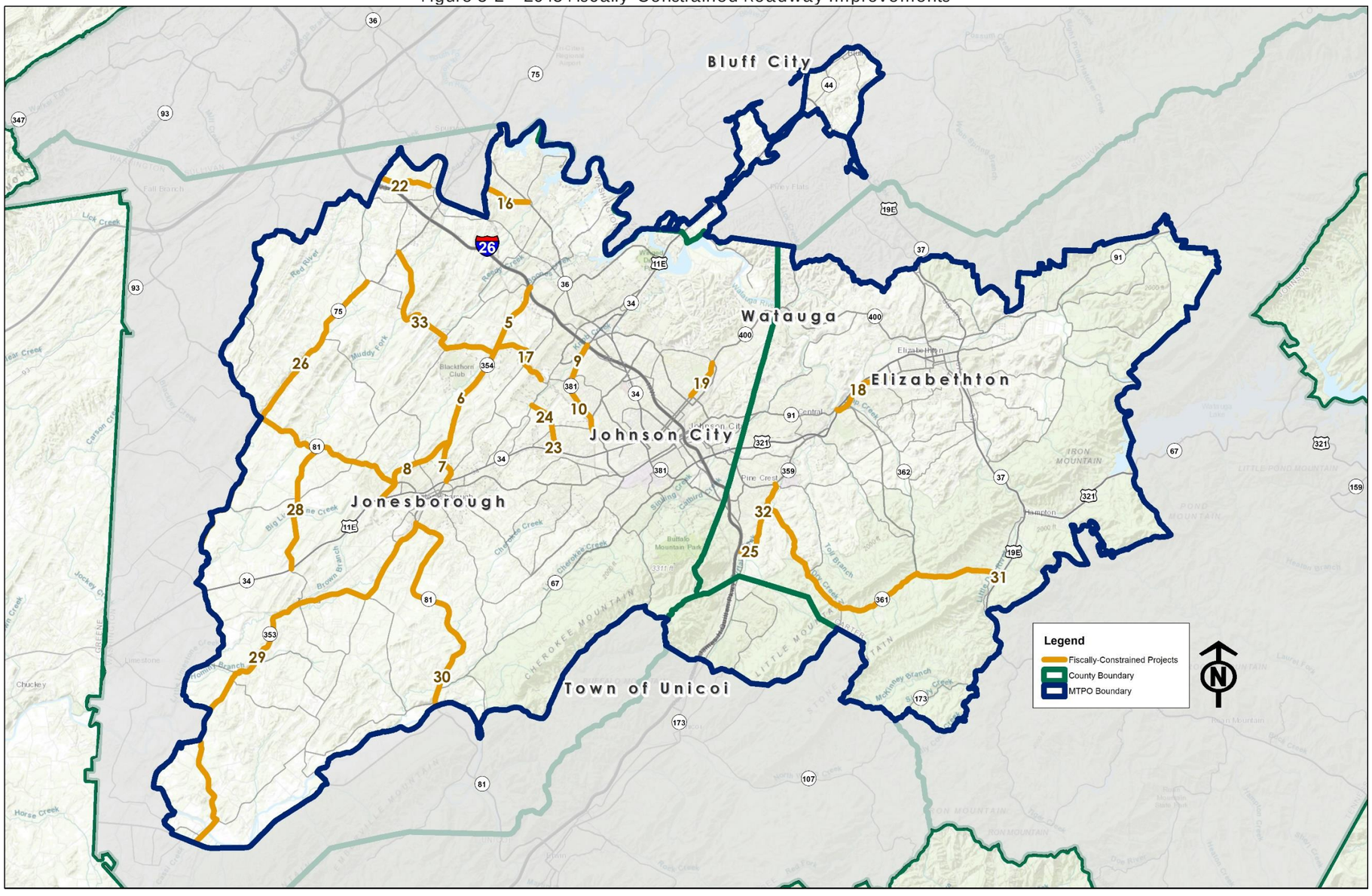


Figure 5-3 illustrates the predicted roadway level of service conditions in 2045 based on implementing recommended improvements as part of the Vision Plan Scenario. The Vision Plan scenario includes all projects that are considered cost-feasible as well as those projects for which funds are not expected to be available (illustrative). Figure 5-4 illustrates the results of the Cost Feasible Plan Scenario, which incorporates all of the projects for which funds are reasonably expected to be available by 2045. Table 5-7 also provides a comparison of the three scenarios.

Table 5-7 2045 Vehicle Hours Traveled With & Without Future Planned Improvements

Roadways	E+C Scenario Without Improvements	Vision Plan Scenario With Improvements	Cost Feasible Scenario With Improvements
Interstate	64,670	35,376	58,640
Principal Arterial	48,619	48,916	47,446
Minor Arterial	43,241	41,524	42,349
Collector	29,949	26,851	29,793
Total VHT	186,479	152,667	178,228

Figure 5-5 illustrates the projected vehicle hours traveled (VHT) by facility type for the 2045 Cost Feasible Plan Scenario. As illustrated from the analysis, implementation of the Cost Feasible planned improvements by 2045 should accommodate the region's growing travel demands.

Figure 5-3 2045 Level of Service – Vision Scenario

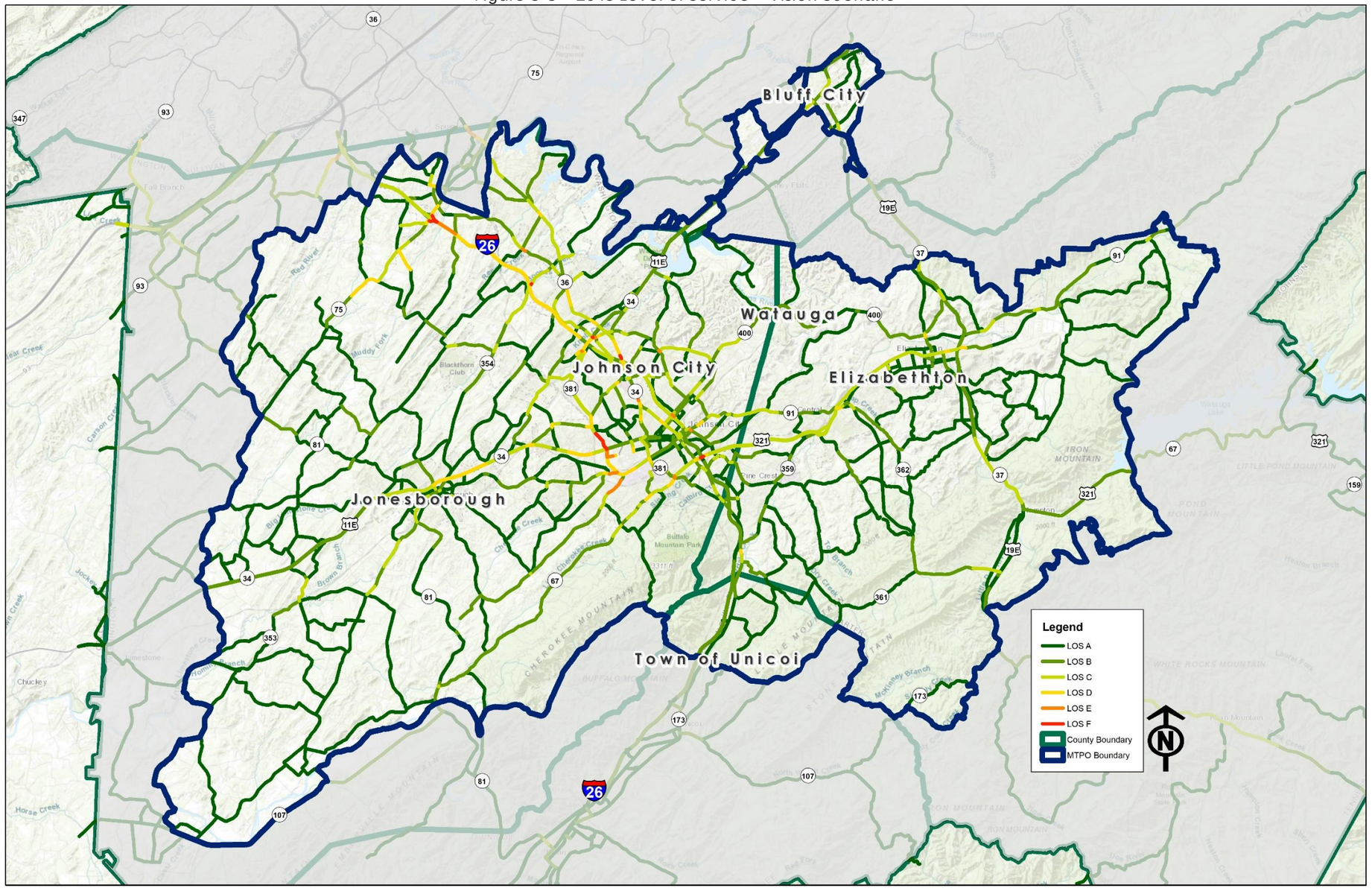


Figure 5-4 2045 Level of Service – Cost Feasible Scenario

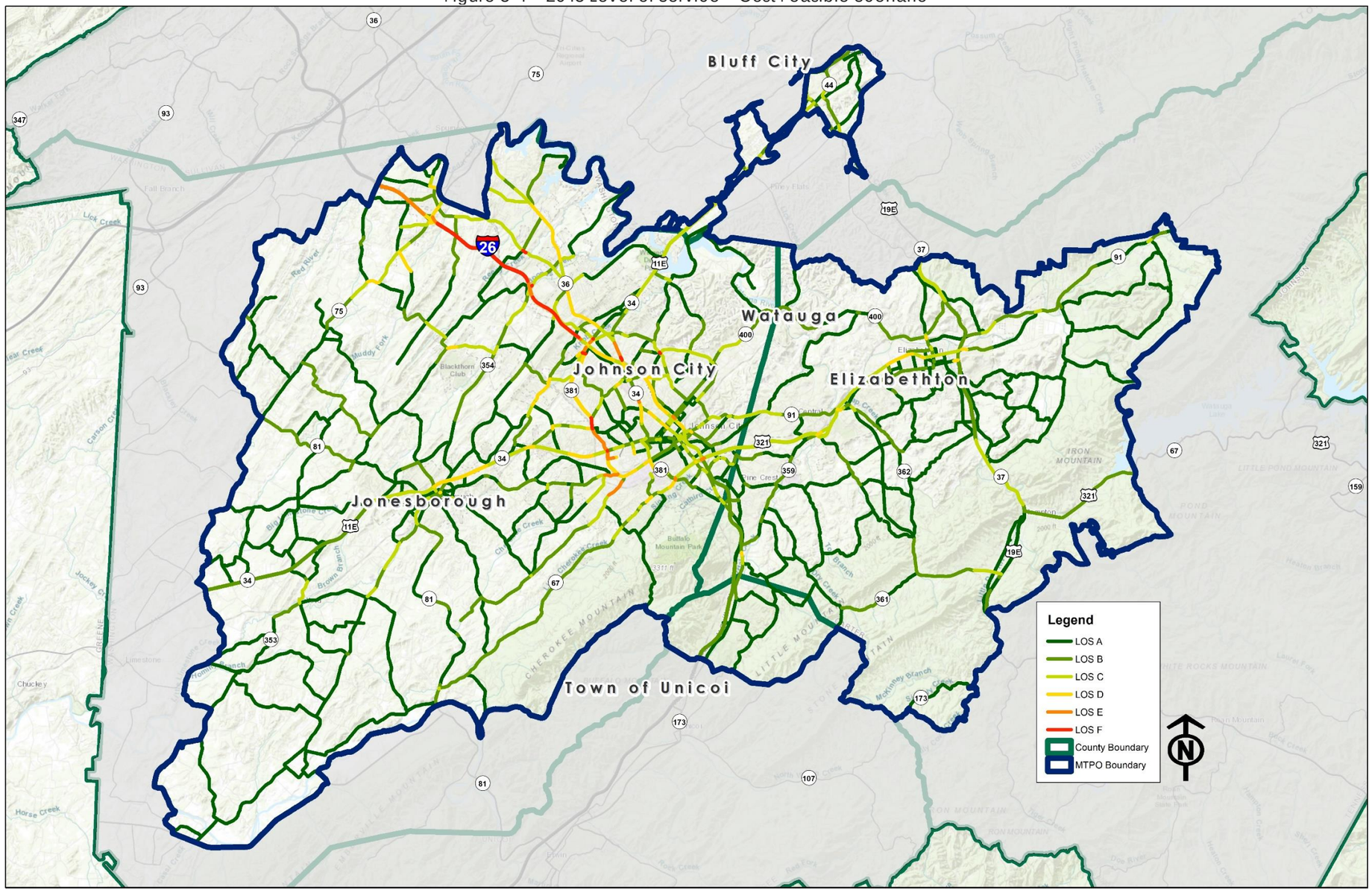
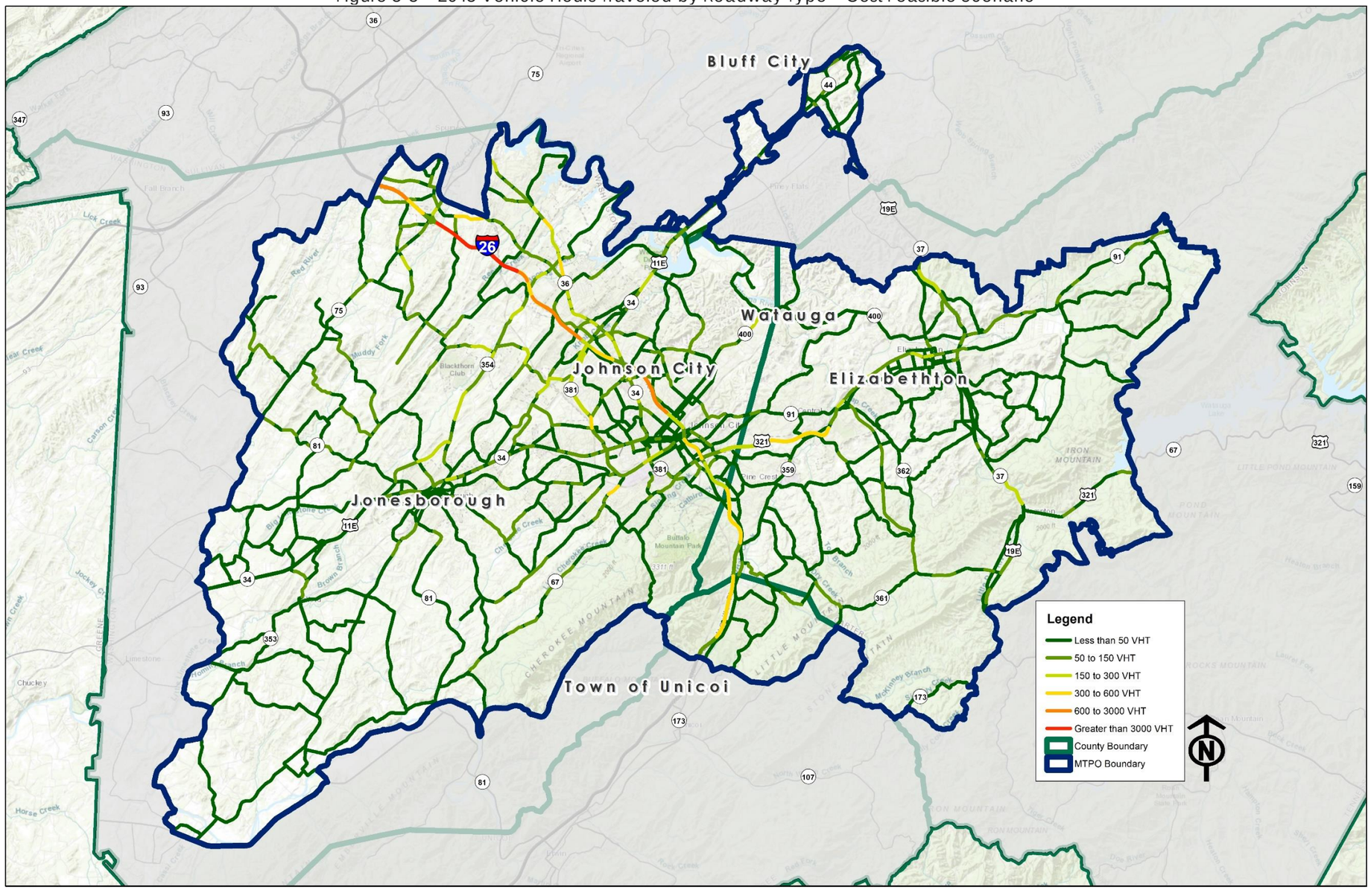


Figure 5-5 2045 Vehicle Hours Traveled by Roadway Type – Cost Feasible Scenario



5.6 FISCAL CONSTRAINT

Demonstrating that transportation operations, maintenance, and capital investments can be funded and adequately maintained into the future is not only mandated by federal law but is an essential component of good planning. This subsection demonstrates fiscal accountability by presenting a financially constrained plan for:

- Operations and Maintenance - for both roadways and public transportation
- Capital Investments - for streets and highways, which includes roadway widening and new roads, bridges, transportation system management and intelligent transportation systems (ITS), walkways and bikeways, as well as public transportation

through the year 2045 for the MTPO area. All revenues and expenses in this analysis represent year of expenditure (YOE) dollars as required by the FAST Act.

Year of Expenditure Costs

To comply with the requirement of 23 CFR 450.324 (g) (11) (iv) "year of expenditure dollars", US inflation rate data were evaluated. Inflation is an increase in the price you pay or a decline in the purchasing power of money. In other words, Price Inflation is when prices get higher or it takes more money to buy the same item. Inflation is measured by the Bureau of Labor Statistics in the United States using the Consumer Price Index. Long-term US inflation trends (over a 25- to 30-year time period) track at about 3% per year. As part of the 2045 MTP, the MTPO further researched this topic and found that FHWA recently updated the National Highway Construction Cost Index (NHCCI), which is a quarterly price index intended to measure the average changes in the prices of highway construction costs over time. Since 2003, the NHCCI reveals an annual average 4% growth in project costs. Consequently, project cost estimates are inflated by 4% per year to the mid-point of the horizon year they are planned to occur in (2025 and 2045) to reflect a likely project cost at "year of expenditure" (YOE).

Operations and Maintenance – Revenue & Expenses

This subsection summarizes the operating and maintenance revenues and expenditures of the 2045 MTP. Revenues are consistent with the financial analysis as described in Subsection 5.3 and expenditures are described in Section 5.4.

The most expensive non-capital highway activity is roadway maintenance and operations. Maintenance costs include routine and regular expenditures required to keep highways, streets, and rights-of-way in usable conditions such as patching repairs, bridge painting, and other maintenance activities. Additionally, there are other traffic service costs such as snow and ice-removal, pavement marking, signs, and litter removal.

The MTPO, in consultation with TDOT was able to determine future operations and maintenance funding levels for streets and highways for the MTPO area based on historic funding trends. A 3% annual growth rate, compounded annually over current funding levels, was determined to be appropriate for operations and maintenance funding based on past funding growth trends within the MTPO area. While maintenance

expenditures within the MTPO area are estimated to increase in the future, various safeguards are in place to ensure the continued long-term maintenance of streets and highways within the region. For example, within Tennessee, to remain eligible for state gas tax revenues, Tennessee law requires that local governments annually appropriate and allocate funds for road maintenance purposes from local revenue sources in an amount not less than the average of the five preceding fiscal years. If a jurisdiction fails to meet this provision, they in turn lose out on the State Gas Tax revenues that otherwise would have come to that jurisdiction. In addition, Tennessee law requires TDOT to set-a-side State Highway funds for accelerating the resurfacing of the state system of highways in order to establish a 12-year cycle for resurfacing of state roads and eight years on the interstate system.

Operating and maintenance expenses are assumed to grow at a similar rate accounting for incremental increases in operating and maintenance costs and the additional lane-miles that are to be added to the roadway system through system expansion over the planning horizon. Table 5-8 illustrates the anticipated revenues and expenditures for operation and maintenance (O&M) activities within the MTPO area over the plan horizon. As previously stated, IMPROVE Act revenues for O&M activities are not reflected at this time, given that operating and maintenance revenues and expenditures are derived from a historic perspective. As increased funds are realized and expended, future MTP updates will account for these additional dollars and expenditures for O&M activities.

The MTPO, in consultation with JCT, NET Trans, and TDOT determined future operating revenue levels for transit for the MTPO area based on historic funding trends. Table 5-9 illustrates the revenues and expenditures for transit operations within the MTPO area over the plan horizon.

Table 5-8 Streets & Highways Operations & Maintenance Revenues and Expenditures

Revenue Source	Anticipated O & M Revenues (2020-2045)	Anticipated O & M Costs (2020-2045)	Fiscal Constraint Summary[1]
City of Bluff City - State & Local Gas/State Aid Funds	$8,935,000	$8,935,000	$0
City of Elizabethton - State & Local Gas/State Aid Funds	$85,733,000	$85,733,000	$0
City of Johnson City - State & Local Gas/State Aid Funds	$382,166,000	$382,166,000	$0
Town of Jonesborough - State & Local Gas/State Aid Funds	$27,201,000	$27,201,000	$0
Town of Unicoi - State & Local Gas/State Aid Funds	$16,043,000	$16,043,000	$0
City of Watauga - State & Local Gas/State Aid Funds	$1,707,000	$1,707,000	$0
Carter County - State & Local Gas/State Aid Funds[2]	$126,754,000	$126,754,000	$0
Sullivan County - State & Local Gas/State Aid Funds[2]	$319,027,000	$319,027,000	$0
Unicoi County - State & Local Gas/State Aid Funds[2]	$67,506,000	$67,506,000	$0
Washington County - State & Local Gas/State Aid Funds[2]	$283,686,000	$283,686,000	$0
TDOT (Various State Sources)[3]	$285,830,000	$285,830,000	$0
Total	$1,604,588,000	$1,604,588,000	$0

Revenues and costs rounded to the nearest thousands
[1] Funding balance after subtracting planned expenditures from anticipated revenues
[2] County maintenance funds shown are for the complete counties of Carter, Sullivan, Washington, and Unicoi Counties
[3] TDOT maintenance funds shown are for state maintained roadways for the complete counties of Carter, Sullivan, Washington, and Unicoi Counties

Table 5-9 Transit Operations & Maintenance Revenues and Expenditures

Revenue Source	Anticipated O & M Revenues (2020-2045)	Anticipated O & M Costs (2020-2045)	Fiscal Constraint Summary[1]
Operating Assistance - FTA 5307 (Federal & Non-Federal Match)	$132,234,000	$132,234,000	$0
Operating Assistance - Other FTA Programs (FTA 5310, Discretionary, etc.) (Federal & Non-Federal Match)	$11,120,000	$11,120,000	$0
TDOT Critical Trips (CRIT) Program (State & Local Match)	$16,916,000	$16,916,000	$0
Total	$160,270,000	$160,270,000	$0

Revenues and costs rounded to the nearest thousands
[1] Funding balance after subtracting planned expenditures from anticipated revenues

Capital – Revenue & Expenses

This subsection summarizes the capital revenues and expenditures of the recommended 2045 MTP which is presented in Section 5.5 of this Plan.

The following is a summary of the 2045 MTP's planned transportation improvements (by Streets and Highways and Public Transportation funding programs) balanced against anticipated revenues, which have been forecasted to the year 2045. The MTPO, in consultation with TDOT, was able to determine future capital revenues for Streets and Highways for the MTPO area based on historic funding trends.

Table 5-10 illustrates the revenues and expenditures of transportation improvements over the planning horizon within the MTPO area. The total budget for these planned improvements is $543,780,000. Of this amount, $4,000,000 is envisioned to be flexed to the public transportation program to cover transit capital needs that exceed historic transit funding levels over the planning horizon. Including these flexed funds, all anticipated funding is allocated on a project or program with no anticipated surplus in funds for streets and highways.

Table 5-11 illustrates the revenues and expenditures of the planned improvements for transit projects over the planning horizon. Over $42 million in transit capital needs are envisioned over the plan horizon. As mentioned above, $4,000,000 will need to be flexed from the MTPO's streets and highways program to the public transportation program to meet future year transit capital needs.

Table 5-10 Streets & Highways Capital Revenues and Expenditures

2025		Budgeted				Remainder
Funding Programs	Revenue	Project Specific	Bridge Program	Safety/Traffic Program	Bike/Ped & Transit Program	
National Highway Performance Program (NHPP) Funds (NHS, IM, & portion BRR/BR Funds)	$10,827,000	$0	$2,000,000	$8,827,000	$0	$0
Surface Transportation Program (S-STBG) Funds (S-STBG & portion of BRR/BR Funds) State Selected Projects	$8,328,000	$4,600,000	$2,000,000	$1,728,000	$0	$0
Highway Safety Improvement Program (HSIP) Funds Safety Funding	$13,325,000	$11,100,000	$0	$2,225,000	$0	$0
Surface Transportation Program (L-STBG) Funds MPO Selected Projects	$24,151,000	$17,100,000	$0	$3,051,000	$4,000,000	$0
Transportation Alternatives (TA) Funds (EHN, RTP, SRTS Funds)	$1,666,000	$0	$0	$0	$1,666,000	$0
Other Federal-Aid Programs & Discretionary Funds (e.g. APD, ARRA, TIGER, FLAP, NHFP)	$3,331,000	$0	$0	$0	$3,331,000	$0
State (STA or SP and SPPR) Funds State Selected Projects	$1,666,000	$0	$500,000	$666,000	$500,000	$0
State (IMPROVE ACT) Funds State Funded Projects	$92,831,000	$76,557,000	$16,274,000	$0	$0	$0
Local Funding	$10,660,000	$0	$0	$8,100,000	$2,560,000	$0
Totals	$166,785,000	$109,357,000	$20,774,000	$24,597,000	$12,057,000	$0

2025 Capital Expenditures	
MTP Roadway Projects	$32,800,000
IMPROVE Roadway Projects	$76,557,000
IMPROVE Bridge Program	$16,274,000
MTP Bridge Program	$4,500,000
MTP Safety/Traffic Program	$24,597,000
MTP Bike/Ped Program	$10,057,000
Flex Transit	$2,000,000
Total	$166,785,000

	2025	2045	Total
Capital Revenues	$73,954,000	$366,824,000	$440,778,000
IMPROVE Act	$92,831,000	$10,171,000	$103,002,000
Total Capital Revenues	$166,785,000	$376,995,000	$543,780,000

2025 - Investments	
Roadway Improvements	66%
Bridge Improvements	12%
Safety/Traffic Operations	15%
Bike/Ped & Transit Improvements	7%
Total	100%

2045		Budgeted				Remainder
Funding Programs	Revenue	Project Specific	Bridge Program	Safety/Traffic Program	Bike/Ped & Transit Program	
National Highway Performance Program (NHPP) Funds (NHS, IM, & portion BRR/BR Funds)	$53,702,000	$29,200,000	$4,000,000	$20,502,000	$0	$0
Surface Transportation Program (S-STBG) Funds (S-STBG & portion of BRR/BR Funds) State Selected Projects	$41,309,000	$36,437,000	$1,000,000	$3,872,000	$0	$0
Highway Safety Improvement Program (HSIP) Funds Safety Funding	$66,094,000	$50,276,000	$0	$15,818,000	$0	$0
Surface Transportation Program (L-STBG) Funds MPO Selected Projects	$119,796,000	$99,672,000	$0	$14,124,000	$6,000,000	$0
Transportation Alternatives (TA) Funds (EHN, RTP, SRTS Funds)	$8,262,000	$0	$0	$0	$8,262,000	$0
Other Federal-Aid Programs & Discretionary Funds (e.g. APD, ARRA, TIGER, FLAP, NHFP)	$16,524,000	$15,924,000	$0	$0	$600,000	$0
State (STA or SP and SPPR) Funds State Selected Projects	$8,262,000	$1,791,000	$1,000,000	$2,471,000	$3,000,000	$0
State (IMPROVE ACT) Funds State Funded Projects	$10,171,000	$0	$10,171,000	$0	$0	$0
Local Funding	$52,875,000	$50,400,000	$0	$1,400,000	$1,075,000	$0
Totals	$376,995,000	$283,700,000	$16,171,000	$58,187,000	$18,937,000	$0

2045 Capital Expenditures	
MTP Roadway Projects	$283,700,000
IMPROVE Bridge Program	$10,171,000
MTP Bridge Program	$6,000,000
MTP Safety/Traffic Program	$58,187,000
MTP Bike/Ped Program	$16,937,000
Flex Transit	$2,000,000
Total	$376,995,000

2025 & 2045 Capital Expenditures	
MTP Roadway Projects	$316,500,000
IMPROVE Roadway Projects	$76,557,000
IMPROVE Bridge Program	$14,671,000
MTP Bridge Program	$22,274,000
MTP Safety/Traffic Program	$82,784,000
MTP Bike/Ped Program	$26,994,000
Flex Transit	$4,000,000
Total	$543,780,000

2045 - Investments	
Roadway Improvements	75%
Bridge Improvements	4%
Safety/Traffic Operations	15%
Bike/Ped & Transit Improvements	5%
Total	100%

2025 & 2045 - Investments	
Roadway Improvements	72%
Bridge Improvements	7%
Safety/Traffic Operations	15%
Bike/Ped & Transit Improvements	6%
Total	100%

Table 5-11 Public Transportation Capital Revenues and Expenditures

Revenue Source	2025 Horizon Year Rev Est.	2025 Horizon Year (Cost)	2025 Horizon Year (Difference)	2045 Horizon Year Rev Est	2045 Horizon Year (Cost)	2045 Horizon Year (Difference)	Total 2020 - 2045 Rev Est	Total 2025-2045 Horizon Year (Cost)	Total 2020 - 2045 Difference
Urbanized Area Services									
FTA 5307 Capital Assistance - Total	$ 1,339,000	$ 1,339,000	$ -	$ 6,642,000	$ 6,642,000	$ -	$ 7,981,000	$ 7,981,000	$ -
JCT & Other Transit Providers Including NET Trans									
Other FTA Programs (FTA 5310, 5339) & Discretionary Funds - Total	$ 4,610,000	$ 4,610,000	$ -	$ 22,869,000	$ 22,869,000	$ -	$27,479,000	$27,479,000	$ -
IMPROVE Act Capital Grants Program (State 75% / Local 25%) - Total	$ 500,000	$ 500,000	$ -	$ 2,479,000	$ 2,479,000	$ -	$ 2,979,000	$ 2,979,000	$ -
Total Capital Assistance	$ 6,449,000	$ 6,449,000	$ -	$ 31,990,000	$ 31,990,000	$ -	$ 38,439,000	$ 38,439,000	$ -
Flexed Federal Highway Funds									
L-STBG	$ 2,000,000	$ 2,000,000	$ -	$ 2,000,000	$ 2,000,000	$ -	$ 4,000,000	$ 4,000,000	$ -
Total Capital Funding	$ 8,449,000	$ 8,449,000	$ -	$ 33,990,000	$ 33,990,000	$ -	$ 42,439,000	$ 42,439,000	$ -

TSM/ITS, Safety, Bridge, and Multimodal Programs – Revenue & Expenses

In an effort to address systems operations and management needs in a more short-term approach, funding has been allocated for the implementation of transportation system management (TSM) and intelligent transportation systems (ITS) solutions along with program funding for safety projects.

Table 5-12 contains allocated funding levels for these improvement project solutions which may include intersection and signal improvements, minor ramp improvements, and various other geometric, safety, and operational related improvements including ITS applications. As part of the MTPO's TIP development, project needs will be identified and funded from this program approach.

Table 5-12 2045 Planned TSM/ITS/Safety Improvements

Type of Improvement	Time Frame	Anticipated Funding Source	Total Estimated Funding
TSM/ITS/Safety Improvements	2025	NHPP/STBG/HISP/STA/Local	$24,597,000
TSM/ITS/Safety Improvements	2045	NHPP/STBG/HISP/STA/Local	$58,187,000
		Total	$82,784,000

Notes: TSM projects include a broad range of management and operational techniques designed to improve traffic flow, air quality, and movement of vehicles and goods, as well as enhance system accessibility and safety. TSM projects may include: interchange improvements on interstates (e.g. additional turning lanes and/or ramp reconfigurations, and/or signal improvements, signage, and lighting); intersection improvements on non-interstates (e.g. additional turning lanes and/or signal improvements, including pedestrian signals (when warranted), and/or signage and lighting); and other traffic operational improvements (e.g. signal timing, access management, traffic calming, etc.). Additionally, ITS projects are to be based on the Regional ITS Architecture which includes the following categories of project recommendations: Traffic Management, Emergency Management, Public Transportation Management, Traveler Information, Maintenance and Construction Management, and Data Management).

In an effort to provide the MTPO with the ability to readily address bridge needs, funding has been allocated as shown in Table 5-13 for improvements to local and state bridges. These improvements could include activities such as bridge replacement or rehabilitation of aging or substandard bridges. As part of the MTPO's TIP development, project needs will be identified and funded from this program approach.

Table 5-13 2045 Planned Bridge Improvements

Type of Improvement	Time Frame	Anticipated Funding Source	Total Estimated Funding
Bridge Improvements	2025	NHPP (BRR/BR)/STBG/STA/IMPROVE	$20,774,000
Bridge Improvements	2045	NHPP (BRR/BR)/STBG/STA/IMPROVE	$16,171,000
		Total	$36,945,000

Funding for transportation alternatives support greater travel and trip making by non-motorized modes (e.g. walking and biking). Improvements under this program may

include bicycle and pedestrian facilities (e.g. sidewalks, bicycle lanes, bicycle routes, mobility paths, and greenways) and other accommodations (e.g. crosswalks, bike racks, wayfinding signs, lighting, etc.) that promote and support safe and convenient travel by non-motorized modes. Implementation strategies to accommodate facility improvements such as reducing the number of travel lanes or lane widths (i.e. a road diet) to add a bicycle facility or providing a neighborhood connection for safe and convenient walking and biking are considered transportation alternative solutions.

Table 5-14 provides a summary of funding levels for walkway and bikeway improvements within the MTPO area as part of the 2045 MTP. Section 5.3 of the MTP discusses sidewalk and bikeway recommendations within the MTPO area. The selection of pedestrian and bikeway improvements is to occur as part of the MTPO's TIP development to allow for coordination with other transportation improvements and programming decisions. Table 5-15 contains a listing of the public transportation improvements of the 2045 MTP.

Table 5-14 2045 Planned Transportation Alternatives Improvements

Type of Improvement	Time Frame	Anticipated Funding Source	Total Estimated Funding
Transportation Alternatives (Bicycle & Pedestrian Improvements)	2025	TA (Enhancement, RTP, SRTS)/STBG STA/Discretionary/Local	$10,057,000
Transportation Alternatives (Bicycle & Pedestrian Improvements)	2045	TA (Enhancement, RTP, SRTS)/STBG STA/Discretionary/Local	$16,937,000
		Total	$26,994,000

Table 5-15 2045 Planned Transit Improvements

Existing Service Vehicle Replacement - Capital Needs									
Current Vehicle Fleet		Normal Service Life (Years)	Number of Vehicles Per Horizon Year		Total Number of Vehicles	Total Estimated Unit Cost [2]	Year of Expenditure Estimates [3]		
Type[1]	Number of Vehicles		2025	2045			2025	2045	Total 2025-2045
Van (2008 - 8-2 WC L/R) - DR	1	4	3	5	8	$45,000	$156,000	$405,000	$561,000
Van (2009 - 8-2 WC L/R) - DR	1	4	3	4	7	$45,000	$156,000	$324,000	$480,000
Van (2010 - 12-2 WC L/R) - DR	1	5	2	4	6	$50,000	$116,000	$360,000	$476,000
Van (2010 - 8-2 WC L/R) - DR	2	4	4	10	14	$45,000	$208,000	$810,000	$1,018,000
Van (2013 - 8-2 WC L/R) - DR	2	4	6	8	14	$45,000	$312,000	$648,000	$960,000
Mini-Van (2013 - 5-1 WC L/R) - DR	3	4	9	12	21	$35,000	$369,000	$756,000	$1,125,000
Van (2014 - 12-3 WC L/R) - DR	1	5	2	4	6	$50,000	$116,000	$360,000	$476,000
ADA Vehicle (2015 - 3-1 WC L/R) - DR	4	4	8	20	28	$35,000	$328,000	$1,260,000	$1,588,000
Mini-Van (2016 - 6-1 WC L/R) - DR	1	4	2	5	7	$35,000	$82,000	$315,000	$397,000
Van (2017 - 16-2 WC L/R) - DR	1	5	1	4	5	$50,000	$58,000	$360,000	$418,000
Trolley Bus (2002 - 28-2 WC L/R) - Route	1	12	1	2	3	$100,000	$116,000	$362,000	$478,000
Bus (2010 - 23/2 WC L/R) - Route	15	7	30	45	75	$140,000	$4,860,000	$11,385,000	$16,245,000
Bus (2016 - 24/2 WC L/R) - Route	6	12	0	12	12	$335,000	$0	$7,260,000	$7,260,000
			71	135	206	Total	$6,877,000	$24,605,000	$31,482,000

New Service & New Service Vehicle Replacement - Capital Needs									
New to Vehicle Fleet		Normal Service Life (Years)	Number of Vehicles Per Horizon Year		Total Number of Vehicles	Total Estimated Unit Cost [2]	Year of Expenditure Estimates [3]		
Type	Number of Vehicles		2025	2045			2025	2045	Total 2025-2045
Van	3	5	6	12	18	$50,000	$348,000	$1,080,000	$1,428,000
Bus	2	7	2	6	8	$140,000	$324,000	$1,518,000	$1,842,000
			8	18	26	Total	$672,000	$2,598,000	$3,270,000

Other Transit - Capital Needs				
Other Transit - Items		Year of Expenditure Estimates [3]		
		2025	2045	Total 2025-2045
Bus Shelters, Benches, & Stop/Transfer/Terminal Improvements		$500,000	$4,087,000	$4,587,000
System Signs, Amenities & Other Enhancements (e.g. bike & ped facilities, safety, & security)		$150,000	$900,000	$1,050,000
ITS-AVL & Other Technologies (e.g. software, systems, & equipment)		$150,000	$900,000	$1,050,000
Support Facilities, Vehicles, & Equipment		$100,000	$900,000	$1,000,000
	Total	$900,000	$6,787,000	$7,687,000
	Grand Total	$8,449,000	$33,990,000	$42,439,000

Notes:
[1] Type - Vehicle Type (Year of Vehicle, Seating Capacity/Wheelchair Capacity, Lift/Ramp Equipped) / Service Type - Route or DR (Demand Response)
[2] Current year dollars (2017)
[3] Estimated cost in future year based on inflation (See Section 5.6 for further details)

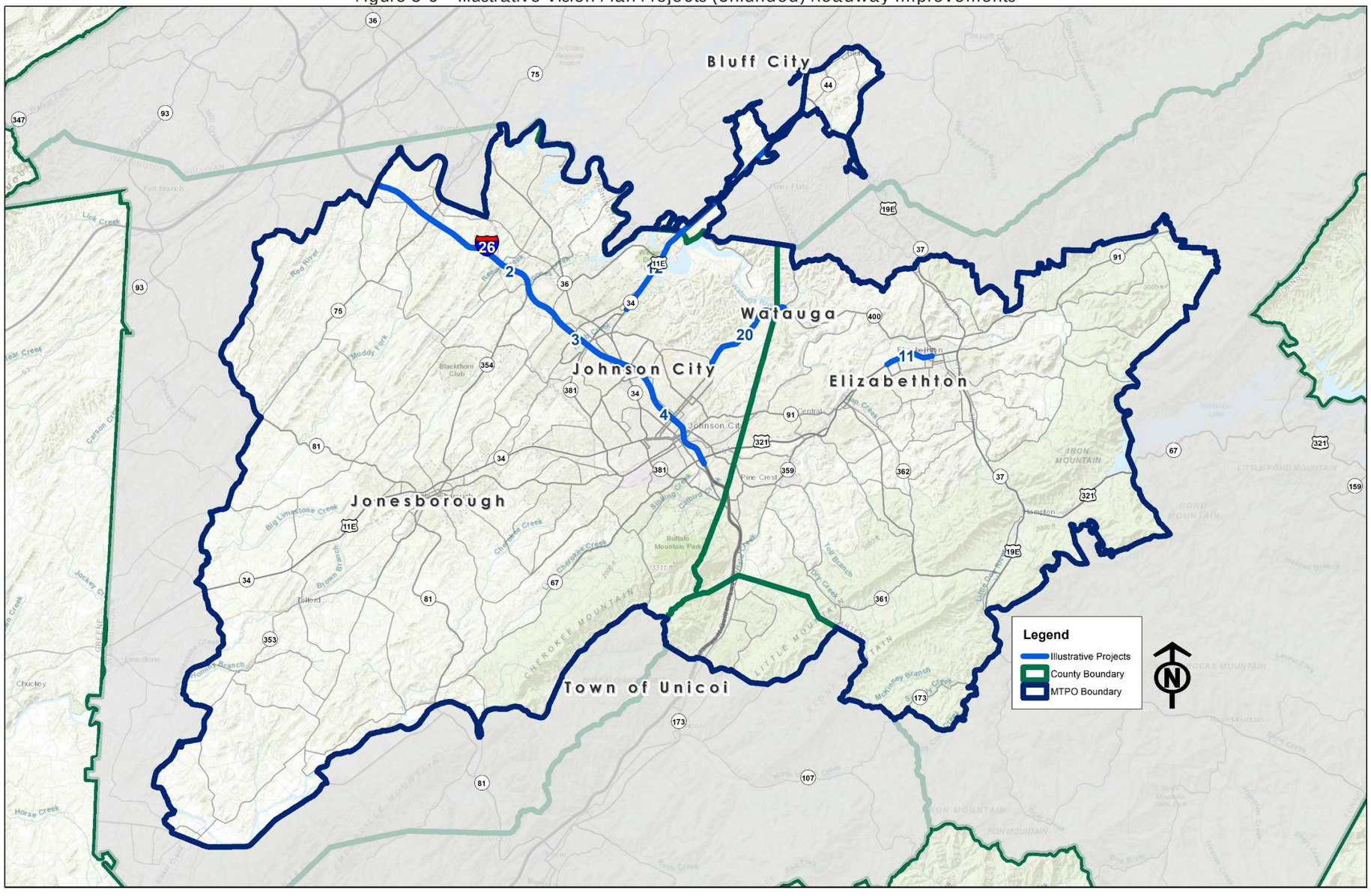
5.7 UNFUNDED NEEDS

Table 5-16 provides a listing of un-funded transportation improvement projects within the MTPO area. These projects, which are illustrated on Figure 5-6, are not financially affordable, given current assumptions on availability of future transportation funds over the plan horizon. As funding becomes available, these projects will need to be amended into the financially constrained portion of the 2045 MTP in order to be funded.

Table 5-16 Unfunded Illustrative Vision Plan Projects

2045 MTP #	Jurisdiction	Roadway	From	To	Length Miles	Federal Functional Class	Type of Improvement	Project Description	2017 Costs
1	Johnson City	I-26	I-81	Bobby Hicks Hwy (SR 75)	3.7	Interstate	Widening	Widen existing 4 lane interstate to 6 lanes	$35,500,000
2	Johnson City	I-26	Bobby Hicks Hwy (SR 75)	Boones Creek Rd (SR 354)	3.7	Interstate	Widening	Widen existing 4 lane interstate to 6 lanes	$36,500,000
3	Johnson City	I-26	Boones Creek Rd (SR 354)	N Roan St (US11E)	3.4	Interstate	Widening	Widen existing 4 lane interstate to 6 lanes	$37,500,000
4	Johnson City	I-26	N Roan St (US11E)	US 321	3.7	Interstate	Widening	Widen existing 4 lane interstate to 6 lanes	$49,600,000
10	Johnson City	N. State of Franklin (SR 381)	Knob Creek Road	Indian Ridge Road	1.9	Principal Arterial	Widening	Widen existing 4 lane roadway to 6 lanes	$18,300,000
11	Elizabethton	Elk Ave/Broad Street (SR 67)	Hudson Drive	Lynn Ave (SR 400)	1.4	Principal Arterial	Widening	Widen existing/future 4/5 lane cross-section (associated with E+C project SR 91 ext. PIN # 043975.01) to 6 lanes	$15,800,000
12	Johnson City	Bristol Hwy (SR 34)	N. State of Franklin (SR 381)	Washington / Sullivan Co. Line	3.1	Principal Arterial	Widening	Widen existing 4/5 lane roadway to 6/7 lanes	$26,900,000
13	Johnson City	Bristol Hwy (SR 34)	Washington / Sullivan Co. Line	US 19E	4.5	Principal Arterial	Widening	Widen existing 4 lane roadway to 6/7 lanes	$22,400,000
20	Johnson City	Watauga Rd (SR 400)	E Fairview Ave	Piney Flats Road	2.8	Minor Arterial	Reconstruction	Reconstruct existing 2 lane roadway to 3 lanes (adding a center turn lane)	$16,800,000

Figure 5-6 Illustrative Vision Plan Projects (Unfunded) Roadway Improvements



5.8 Short Range Strategies

Short-range strategies (3-5-year horizon) have been identified through the development of this plan. Implementation of these strategies is intended to result in a more detailed understanding of specific elements and demands on the transportation system, and ultimately aid in advancing sound transportation investments within the region. The short range strategies the MTPO should undertake in the next 3-5 years include:

- Update/develop a regional bicycle and pedestrian plan
- Continue to work with JCT and other transportation providers in furthering public transportation options within the MTPO area
- Partner with area MPOs (Kingsport and Bristol) to explore future regional transportation needs
- Work to establish a transit operational plan for meeting transportation needs throughout complete urbanized areas of the Bristol, Kingsport, and Johnson City MPOs
- Encourage TDOT to complete an interstate corridor study on I-26
- Work with local member jurisdictions to update local land use and transportation plans within the MTPO area
- Continue the use of corridor and subarea studies to evaluate transportation issues at the sub-regional level that can feed into the update of future MTPs
- Explore opportunities to increase the MTPO area's understanding and incorporation of adaptation measures to reduce harm and risk associated with the impacts of climate change and extreme weather on the region's transportation system
- Conduct a study on the future impact of the next census in 2020 and its effect on the Tri-Cities' area MPOs

6 PROJECT IMPACTS

FAST Act calls for continued environmental consideration in the development of metropolitan transportation plans. The Johnson City MTPO, as part of the 2045 MTP, has developed an initial understanding of environmental conditions, which can be used to assist in the project development process once a project has moved from the planning stage of this document to the programming stage (e.g. the TIP) for ultimate project implementation.

The following section includes an initial review of the proposed MTP projects (presented in Section 5.0 of this Plan) relative to environmental features such as, communities of concern (e.g. environmental justice populations), historic and cultural resources, wetlands, and floodplain areas. It also provides a discussion of potential environmental mitigation activities at the regional level. Lastly, a discussion on greenhouse gas (GHG) reduction strategies as well as a discussion of climate change adaptation strategies is reflected in the MTPO's 2045 MTP.

6.1 TITLE VI AND ENVIRONMENTAL JUSTICE

Federal law requires that MPOs ensure that individuals not be excluded from participating in, denied the benefit of, or subject to discrimination under any program or activity receiving federal funding on the basis of race, color, national origin, age, sex, or disability.

While Title VI and Environmental Justice (EJ) concerns have most often been raised during project development, it is important to recognize that the law also applies equally to the processes and products of planning. Title VI of the Civil Rights Act prohibits discrimination on the basis of race, color, or national origin. Environmental Justice Executive Order 12898, Federal Actions to Address Environmental Justice (EJ) in Minority and Low-Income Populations, calls for the identification and addressing of disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority and low-income populations.

Appendix V – Title VI and Environmental Justice Assessment documents the MTPO's efforts to determine benefits and burdens to EJ communities within the MTPO area relative to the 2045 MTP. The analysis indicates that in general, neither low-income nor minority populations in the region would endure high and disproportionate impacts due to the projects proposed by the 2045 MTP. Complete findings of this assessment, potential project impacts, and mitigation strategies are presented in Appendix V.

6.2 HISTORIC, CULTURAL, AND NATURAL RESOURCES

As part of the 2045 MTP, an environmental assessment of historic, cultural, and natural resources was developed to address provisions of the FAST Act. The intent of this analysis is to incorporate environmental considerations early in the planning process so that the

project development processes are more streamlined, by including realistic assumptions of potential environmental considerations, impacts, and costs.

Appendix VI – Environmental Review, documents the MTPO's efforts to understand environmental conditions within the MTPO early in the planning process. The environmental assessment includes:

- a discussion of potential environmental impacts and avoidance and mitigation activities at the policy/strategy level based on environmental regulatory framework,
- a comparison of project recommendations in the 2045 MTP with available local, state and federal, maps and inventories of historic and natural resources, and
- identifies environmentally sensitive areas and mitigation strategies that could be considered to reduce potential impacts related to transportation improvement projects.

6.3 Environmental Mitigation Strategies

As previously discussed, the FAST Act continues the SAFETEA-LU intention to enhance the consideration of environmental issues and impacts within the transportation planning process. As such, metropolitan and statewide transportation plans must include a discussion of types of potential environmental mitigation activities as part of their plans. The following strategies will be utilized by the MTPO to address and consider environmental impacts relative to the decisions of the MTPO early in the planning process:

- Embrace the principles of Context Sensitive Solutions (CSS) as a means of developing transportation facilities that fit its physical setting and preserves scenic, aesthetic, historic, and environmental resources, while maintaining safety and mobility.
- Continue to utilize the Region's GIS to identify environmental features (both physical and social) early in the planning process as a means of avoidance and/or to establish early corrective action plans prior to project construction.
- Partner with local, state, and federal resource agencies early in the planning process to identify potential issues relative to projects under consideration in the MTPO's plans and programs to develop appropriate solutions prior to actually beginning the project development process.
- Minimize the construction of transportation investments that would impact wetlands.
- Construct greenways as a means of preserving environmentally sensitive lands from inappropriate development.

Environmental impacts cannot always be avoided. Mitigation is the attempt to offset potential adverse effects of human activity on the environment. Mitigation, as listed below, is one of the last steps in the avoidance and minimization process. The mitigation areas and activities will be consistent with legal and regulatory agencies pertaining to

human and natural environments. Steps to take in the project development process include the following in relation to environmental impacts:

- Avoid Impacts - The first strategic step in the environmental process is to avoid negative impacts altogether.
- Minimize Impacts - If impacts cannot be avoided, they should be minimized by limiting the degree or magnitude of the proposed activity or project.
- Mitigate Impacts – Typical approaches to mitigation include:
    - Rectifying impacts - Repair, rehabilitate, or restore the impacted resource.
    - Reducing or eliminating impacts - Preservation and maintenance operations during the life of the proposed activity or project should seek to reduce or eliminate environmental impacts over time.
    - Compensating for impacts - A substitute or replacement resource or environmental function of equivalent or greater value could be implemented.

The MTPO will continue to work with the agencies, as defined in the MTPO's Public Participation Plan and Consultation process as projects proceed in the project development process, as appropriate. The MTPO recognizes that not every project will require the same level of mitigation; different projects may utilize more mitigation while others require very little. All impacts on environmentally sensitive areas will be analyzed on a project by project basis to examine what mitigation strategies are appropriate.

The following mitigation activities will be considered on a project by project basis. For major construction projects, such as new roadways, or for projects that may have a region-wide environmental impact, a context sensitive solution process should be considered in which considerable public participation and alternative design solutions are used to lessen the impact of the project.

Table 6-1 details mitigation activities that could be considered to deal with the primary areas of concern.

Table 6-1 Potential Mitigation Activities

Environmental Concern	Potential Mitigation Activities
Water Quality and Hydrology	Avoidance, Minimization, Mitigation; Maintain meanders in streams; minimize concrete channelization of streams; reduce use of riprap on river banks opting instead for natural vegetation; wetland mitigation banking; implementation of green infrastructure; bridge sensitive areas; improve stormwater management; compensation (could include preservation, creation, restoration, in lieu fees, riparian buffers); use of reduced-salt or reduced-sand road treatment mixtures in sensitive areas; use of best practices regarding herbicide use
Threatened and Endangered Species, Natural Areas	Avoidance, Minimization, Mitigation; reduction of habitat fragmentation; habitat banking; Smart Growth Concepts; wildlife fencing; maintenance of vegetation along infrastructure rights-of-way; use of native trees, shrubs, and warm season grasses for stabilization of disturbed areas; maintenance of important wildlife movement corridors, possible provision of wildlife crossings; Memoranda of Agreements for species management
Noise	Avoidance, Minimization, Mitigation; Truck restrictions such as the use of engine brakes; noise barriers; construction schedule considerations; speed control; pavement material considerations; roadway design (Context Sensitive Design)
Air Quality and Climate Change	Minimization, Mitigation, Adaptation; Establishing a low-carbon fuel standard (lcfs); Setting regional targets for per capita GHG Green House Gas (GHG) reductions from passenger vehicles; facility energy code standards; reduce and minimize impacts of exposed soils; minimization of idling, both passenger and commercial vehicles through congestion reduction and on-board technologies for freight transport
Neighborhoods, Communities, Homes & Businesses	Minimization, Mitigation; Context Sensitive Design; transit-oriented development (TOD); Smart Growth concepts; noise abatement; ensuring environmental justice; avoidance, minimization of agricultural lands; construction schedule coordination with farm operators; reimbursements to farm operators for loss of income; traffic calming design considerations
Cultural Resources	Avoidance, Minimization, Mitigation: Design considerations, design exceptions, and variances that avoid or minimize impacts to historic properties should be considered first. If avoidance or minimization isn't possible mitigation measures should be considered in cooperation with the appropriate resource agencies and depend on the type of resource being impacted.
Parks and Recreation Areas	Avoidance, Minimization, Mitigation; design considerations; replacement of impacted facilities
Underground Storage Tanks & Contaminated Sites	Avoidance, Minimization, Mitigation; design exceptions and variances; environmental compliance monitoring

6.4 Climate Change

Climate change has become an increasingly important policy issue in transportation given, not only the negative impacts of human activity and carbon emissions from vehicles, but also the associated impacts of climate change and extreme weather events on our transportation systems assets. While a much debated topic, there is general scientific consensus that the earth is experiencing a warming trend and that human-induced increases in atmospheric greenhouse gases (GHGs) are a significant cause. The combustion of fossil fuels is by far the biggest source of GHG emissions. Additionally, our nation's transportation infrastructure is vulnerable to associated weather patterns and extreme weather events (e.g. flooding, drought, tornadoes, fog, etc.) that impact our transportation assets (i.e. roads, bridges, transit systems, etc.) today and in the future.

Greenhouse Gas Emissions

In the United States, transportation is the second largest source of GHG emissions, after electricity generation. Transportation accounts for 26% of United States greenhouse gas emissions based on recent data. The largest sources of transportation-related GHG emissions include passenger cars and light-duty trucks, including sport utility vehicles, pickup trucks, and minivans.

A wide range of strategies are available to reduce GHG emissions from the transportation sector. The Center for Climate Strategies, a nonpartisan nonprofit organization that assists governments with climate change issues, maintains a catalog of sample state-level GHG-reducing actions and policy options based on actions undertaken or considered by state, local, and private actors. Table 6-2 provides a comparison of select transportation and land use GHG-reducing actions (from the Center for Climate Strategies Catalog of Sample State-Level GHG-Reducing Actions) to recommendations of the MTPO's 2045 MTP. As illustrated in the table, there are a number of plan recommendations that work to reduce GHG emissions within the MTPO region.

Table 6-2 2045 MTP Greenhouse Gas Reduction Strategies

Center for Climate Strategies Sample Transportation & Land Use GHG-Reducing Action	2045 MTP
PASSENGER VEHICLES Passenger Vehicle Technology • Hybrid buses Passenger Vehicle Operations • Enforce speed limits Fuel-Related Measures • Biodiesel expansion (biodiesel, liquefied petroleum gas, ethanol) • Alternative fuel infrastructure development	• A number of the 2045 MTP goals and objectives (see Section 2.0) relate to promoting investment solutions that reduce carbon and other harmful emissions from transportation. • Efforts within the MTPO region and at a state level do exist relative to passenger vehicle GHG-reduction initiatives. For example, throughout TN the use of alternative fuel buses is being promoted and efforts are in place for expanding the infrastructure of available biodiesel facilities along the TN's interstate system. I-26 through the MTPO area are part of TN's Biofuel Green Island Corridor Network with facilities available.
LAND USE EFFICIENCY AND MODAL OPTIONS General Location Efficiency • Statewide growth management plan • Smart growth planning, modeling, tools • Land use, zoning, tax, & building code reform • Use of flexible federal transportation funding • Downtown revitalization • Brownfield redevelopment • Infill redevelopment • Traffic calming Increasing Low-GHG Travel Options • Full use of Congestion Mitigation and Air Quality (CMAQ) funds • Improve transit service (frequency, convenience, quality) • Transit marketing & promotion, including individualized transit marketing • Expand transit infrastructure • Guaranteed ride home • Bike and pedestrian infrastructure • Vanpooling and carpooling • Park-and-ride lots • Car sharing • Telecommute, live-near-your-work, and compressed work week • Require government agencies to use telecommuting • Telecommuting centers, support, and incentives Incentives and Disincentives • Commuter choice programs/parking cash-out	• Growth management provisions exist in Tennessee and the largest and fastest growing portion of the MTPO area is covered by growth management provisions (PC 1101). • Land use, zoning, and revitalization and infill plans are in place in the MTPO area. • The MTPO and the 2045 MTP fully support greater use of low-GHG travel options such as expanded transit services, promotion of TDM strategies as well as greater opportunities for sidewalk and bikeway infrastructure.
HEAVY-DUTY VEHICLES Heavy-Duty Vehicle Operations • Enforce speed limits • Improve traffic flow • Truck stop electrification Increasing Low-GHG Heavy-Duty Travel Options • Intermodal freight initiatives • Feeder barge container service • Increase rail capacity and address rail freight system bottlenecks • Shift freight movements from truck to rail • Promote strategies to ease the movement of freight to reduce GHG	• There are a number of goals, objectives, and projects within the 2045 MTP that address GHG reduction strategies for heavy duty vehicles and other vehicle operations. These include: o Nearly $55 million (10% of the MTPO region's transportation capital funds) in ITS, safety, and other traffic operational investments within the MTPO region over the planning horizon. o Continued support for enhancements at the Tri-Cities airport including air cargo transportation

Center for Climate Strategies Sample Transportation & Land Use GHG-Reducing Action	2045 MTP
Heavy-Duty Vehicle Incentives & Disincentives • Procurement of efficient fleet vehicles (public, private, or other) Intercity Passenger Travel: Aviation, Rail, & Bus • Airport ground equipment • Intercity bus incentives and subsidies Off-Road Vehicles (E.G., Construction Equipment, Etc.) • Incentives for purchase of efficient vehicles and equipment • Improved operations, operator training • Increased use of alternative fuels or low-sulfur diesel	o Continued support of intercity bus service between surrounding communities o Continued support of improvements to railroad infrastructure o Continued support of improved traffic flow, signal operations, and access management.

Extreme Weather and Climate Related Events

Weather- and climate-related events are already affecting our transportation systems locally and across the United States. Impacts on the transportation system can be divided into several categories:

- Damage or destruction of key infrastructure,
- Upgrading existing infrastructure to prevent damage,
- Weather-related closure or disruption of transportation,
- Safety impacts of adverse weather,
- Health impacts on vulnerable populations from loss of access to services, and
- Changes in maintenance and operations costs for pavement or maintenance and/or snow or debris removal.

Specific areas of concerns for the Johnson City MTPO area that can impact the transportation system's resiliency that deal with the natural environment and disasters include:

- Severe weather (tornados, blizzards, etc.)
- Flooding
- Seismic events
- Rockslides

In 2015, TDOT participated in one of seven pilot projects funded by FHWA that assesses the vulnerability of the state's transportation infrastructure to extreme weather. The statewide vulnerability assessment included all transportation infrastructures (roads, rivers, rail, transit, and aviation) and identified the associated impacts of extreme weather on those transportation assets. While the Johnson City region scores relatively low in terms of vulnerability compared to other regions of the state, the MTPO area does contain a number of critical corridors (roadways and rail) and bridges vital to commerce and individual travel.

The MTPO will continue to work with TDOT and other stakeholders on options to evaluate and improve projects, practices, and programs in response climate impacts on

transportation infrastructure and services in the MTPO area. As opportunities present themselves, the Johnson City MTPO will work to incorporate future vulnerability assessments and transportation resiliency practices into the MTPO's planning processes.

Appendix I – Public Involvement

i. Public Meeting Notices and Advertisements

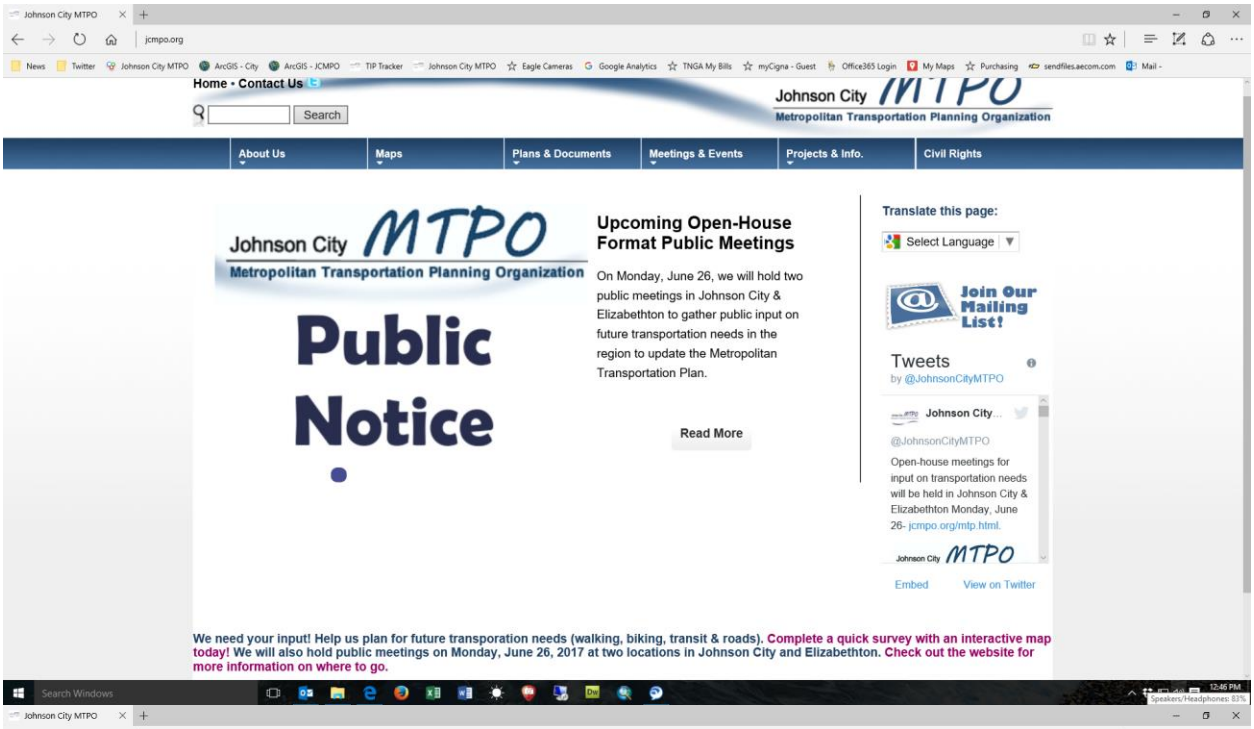
ii. Public Meeting and Stakeholder Meeting Sign-in Sheets

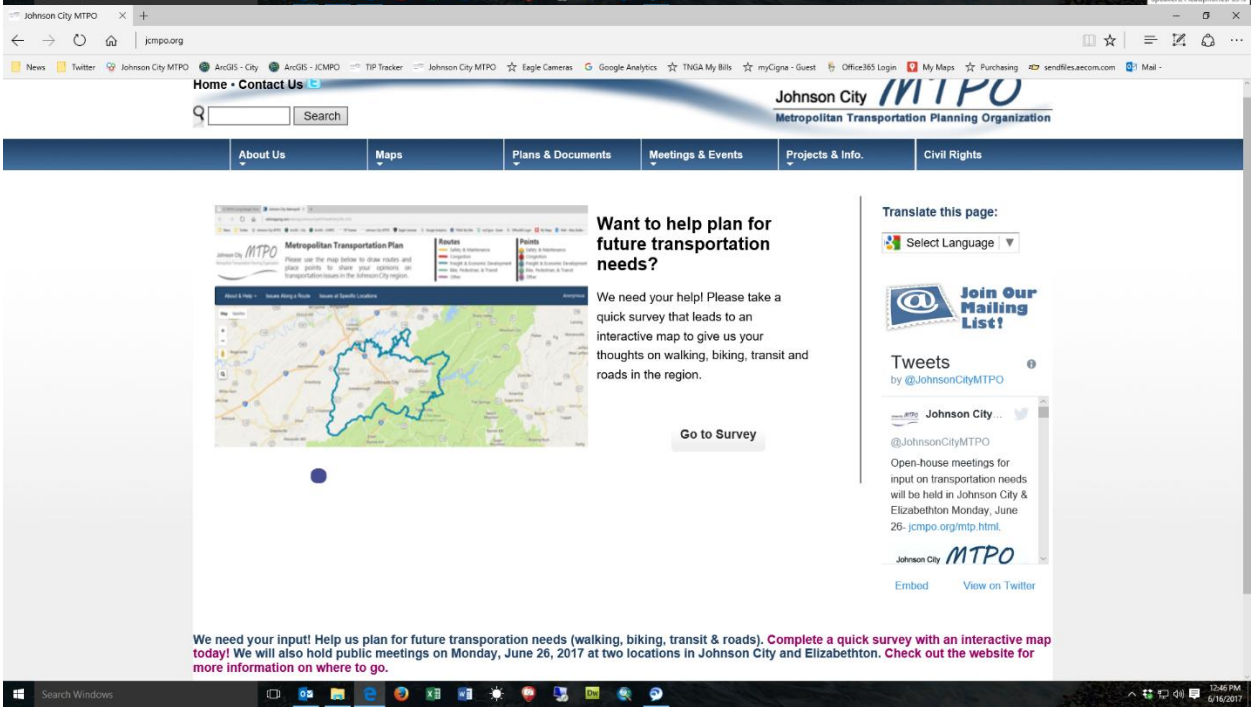
iii. Public Meeting Presentation and Materials

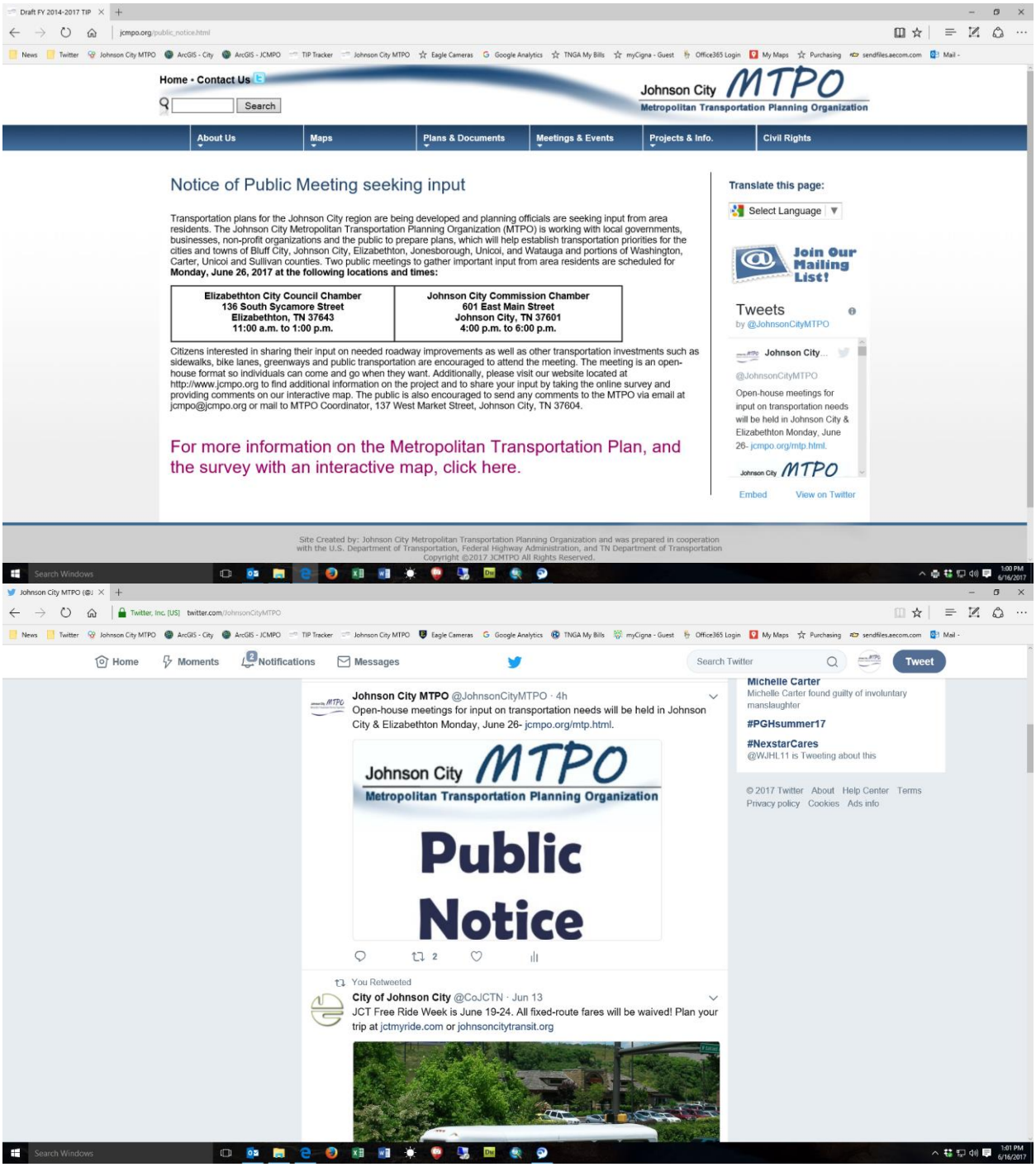
iv. MTPO Board Meeting Agendas and Materials

v. Online Survey Results

Public Meeting Notices & Advertisements



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Notice of Public Meeting seeking input
Transportation plans for the Johnson City region are being developed and planning officials are seeking input from area residents. The Johnson City Metropolitan Transportation Planning Organization (MTPO) is working with local governments, businesses, non-profit organizations and the public to prepare plans, which will help establish transportation priorities for the cities and towns of Bluff City, Johnson City, Elizabethton, Jonesborough, Unicoi, and Watauga and portions of Washington, Carter, Unicoi and Sullivan counties. Two public meetings to gather important input from area residents are scheduled for Monday, June 26, 2017 at the following locations and times:
Elizabethton City Council Chamber
136 South Sycamore Street
Elizabethton, TN 37643
11:00 a.m. to 1:00 p.m.
Johnson City Commission Chamber
601 East Main Street
Johnson City, TN 37601
4:00 p.m. to 6:00 p.m.
Citizens interested in sharing their input on needed roadway improvements as well as other transportation investments such as sidewalks, bike lanes, greenways and public transportation are encouraged to attend the meeting. The meeting is an open-house format so individuals can come and go when they want. Additionally, please visit our website located at http://www.jcmpo.org to find additional information on the project and to share your input by taking the online survey and providing comments on our interactive map. The public is also encouraged to send any comments to the MTPO via email at jcmpo@jcmpo.org or mail to MTPO Coordinator, 137 West Market Street, Johnson City, TN 37604.
For more information on the Metropolitan Transportation Plan, and the survey with an interactive map, click here.
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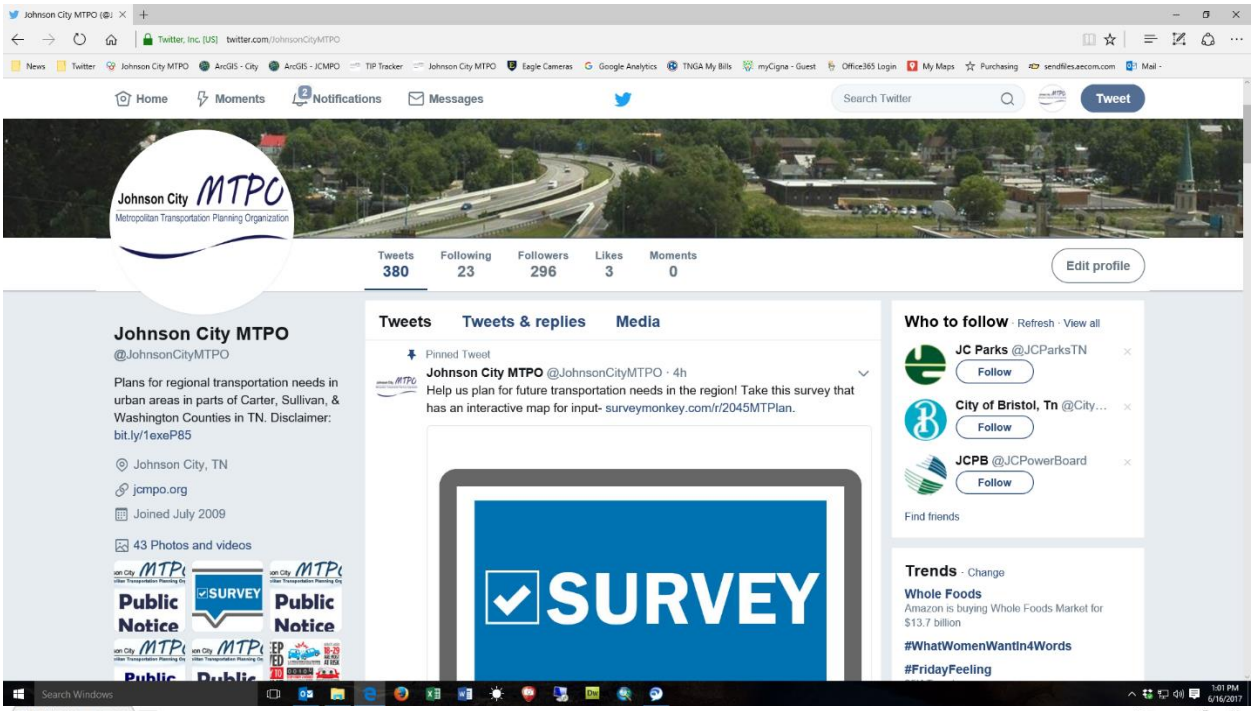
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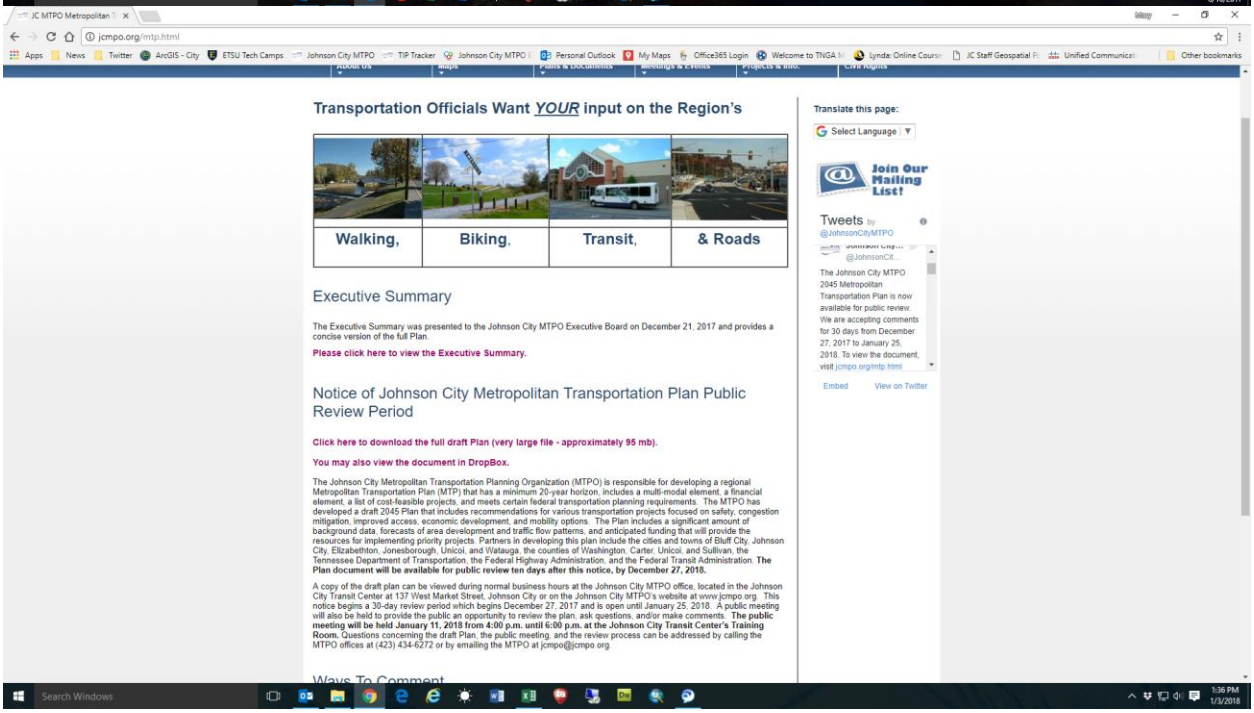
Transportation Officials Want YOUR input on the Region's
Walking,
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Transit,
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Executive Summary
The Executive Summary was presented to the Johnson City MTPO Executive Board on December 21, 2017 and provides a concise version of the full Plan.
Please click here to view the Executive Summary.
Notice of Johnson City Metropolitan Transportation Plan Public Review Period
Click here to download the full draft Plan (very large file - approximately 95 mb).
You may also view the document in DropBox.
The Johnson City Metropolitan Transportation Planning Organization (MTPO) is responsible for developing a regional Metropolitan Transportation Plan (MTP) that has a minimum 20-year horizon, includes a multi-modal element, a financial element, a list of cost-feasible projects, and meets certain federal transportation planning requirements. The MTPO has developed a draft 2045 Plan that includes recommendations for various transportation projects focused on safety, congestion mitigation, improved access, economic development, and mobility options. The Plan includes a significant amount of background data, forecasts of area development and traffic flow patterns, and anticipated funding that will provide the resources for implementing priority projects. Partners in developing this plan include the cities and towns of Bluff City, Johnson City, Elizabethton, Jonesborough, Unicoi, and Watauga, the counties of Washington, Carter, Unicoi, and Sullivan, the Tennessee Department of Transportation, the Federal Highway Administration, and the Federal Transit Administration. The Plan document will be available for public review ten days after this notice, by December 27, 2018.
A copy of the draft plan can be viewed during normal business hours at the Johnson City MTPO office, located in the Johnson City Transit Center at 137 West Market Street, Johnson City or on the Johnson City MTPO's website at www.jcmpo.org. This notice begins a 30-day review period which begins December 27, 2017 and is open until January 25, 2018. A public meeting will also be held to provide the public an opportunity to review the plan, ask questions, and/or make comments. The public meeting will be held January 11, 2018 from 4:00 p.m. until 6:00 p.m. at the Johnson City Transit Center's Training Room. Questions concerning the draft Plan, the public meeting, and the review process can be addressed by calling the MTPO offices at (423) 434-6272 or by emailing the MTPO at jcmpo@jcmpo.org.
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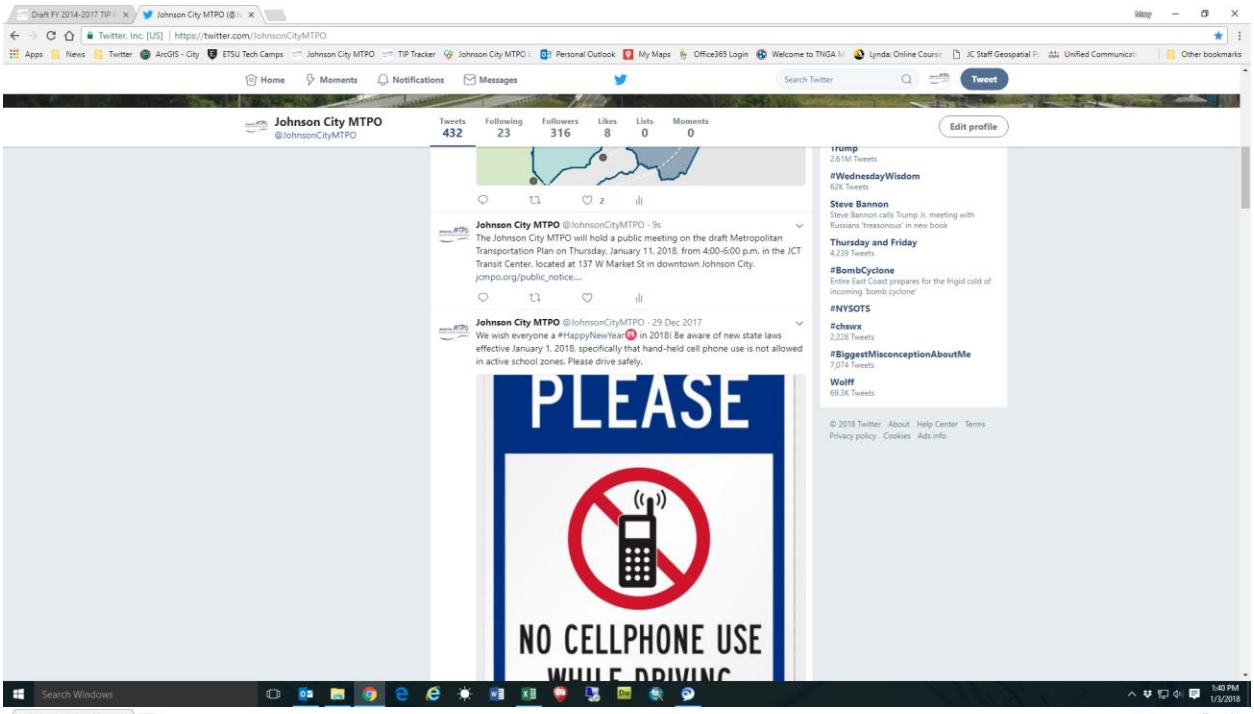
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Johnson City MTPO @JohnsonCityMTPO · 29 Dec 2017
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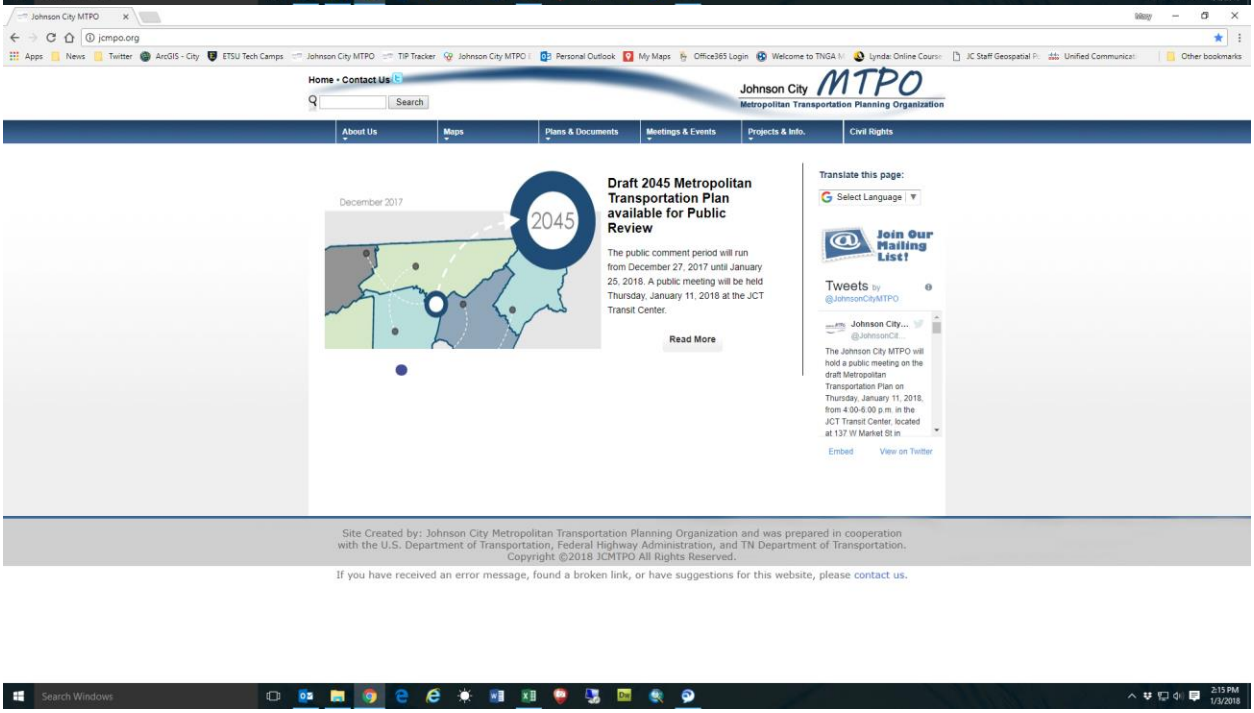
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Draft 2045 Metropolitan Transportation Plan available for Public Review
The public comment period will run from December 27, 2017 until January 25, 2018. A public meeting will be held Thursday, January 11, 2018 at the JCT Transit Center.
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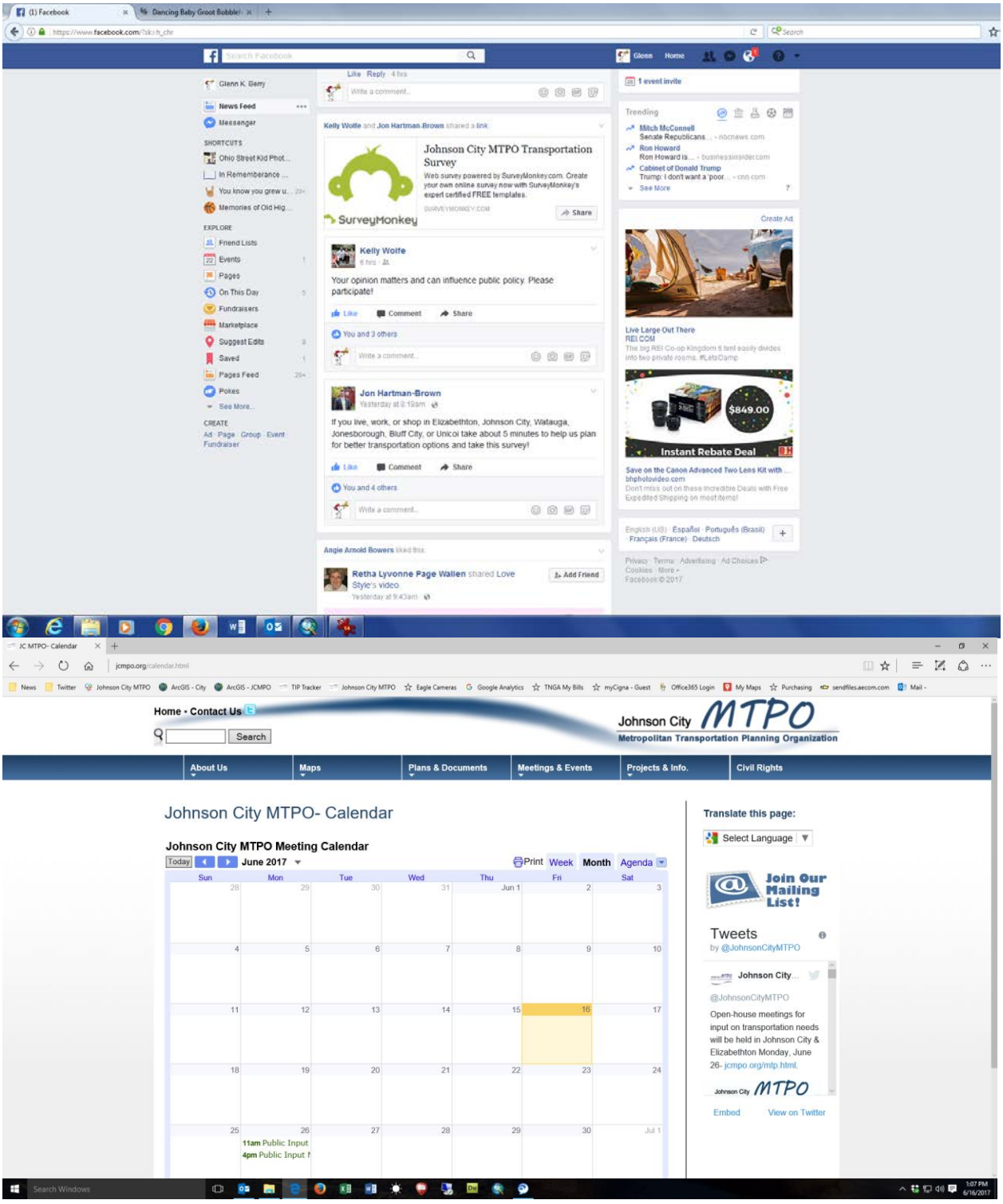
Johnson City MTPO Transportation Survey
Web survey powered by SurveyMonkey.com. Create your own online survey now with SurveyMonkey's expert certified FREE templates.
Kelly Wolfe
Your opinion matters and can influence public policy. Please participate!
Jon Hartman-Brown
If you live, work, or shop in Elizabethton, Johnson City, Watauga, Jonesborough, Bluff City, or Unicoi take about 5 minutes to help us plan for better transportation options and take this survey!
Retha Lyvonne Page Wallen shared Love Style's video.
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Open-house meetings for input on transportation needs will be held in Johnson City & Elizabethton Monday, June 26- jcmpo.org/mtp.html.
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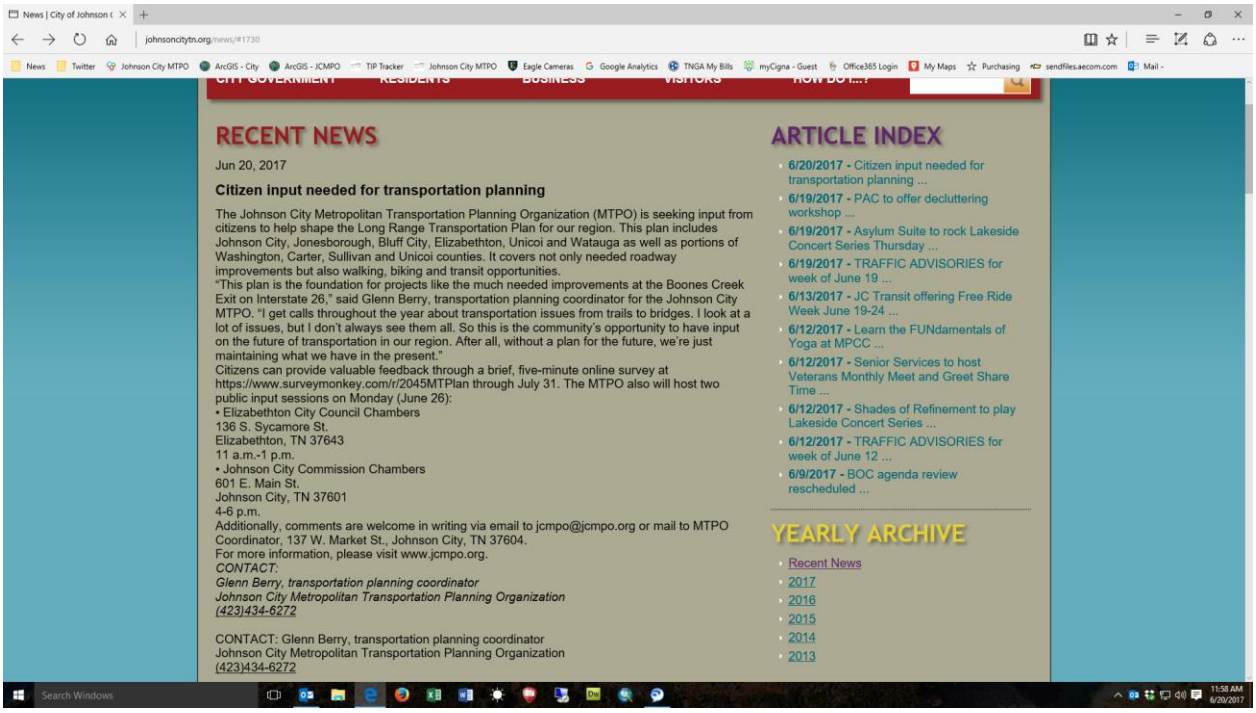

RECENT NEWS

Jun 20, 2017

Citizen input needed for transportation planning

The Johnson City Metropolitan Transportation Planning Organization (MTPO) is seeking input from citizens to help shape the Long Range Transportation Plan for our region. This plan includes Johnson City, Jonesborough, Bluff City, Elizabethton, Unicoi and Watauga as well as portions of Washington, Carter, Sullivan and Unicoi counties. It covers not only needed roadway improvements but also walking, biking and transit opportunities.

"This plan is the foundation for projects like the much needed improvements at the Boones Creek Exit on Interstate 26," said Glenn Berry, transportation planning coordinator for the Johnson City MTPO. "I get calls throughout the year about transportation issues from trails to bridges. I look at a lot of issues, but I don't always see them all. So this is the community's opportunity to have input on the future of transportation in our region. After all, without a plan for the future, we're just maintaining what we have in the present."

Citizens can provide valuable feedback through a brief, five-minute online survey at https://www.surveymonkey.com/r/2045MTPlan through July 31. The MTPO also will host two public input sessions on Monday (June 26):

• Elizabethton City Council Chambers
136 S. Sycamore St.
Elizabethton, TN 37643
11 a.m.-1 p.m.

• Johnson City Commission Chambers
601 E. Main St.
Johnson City, TN 37601
4-6 p.m.

Additionally, comments are welcome in writing via email to jcmpo@jcmpo.org or mail to MTPO Coordinator, 137 W. Market St., Johnson City, TN 37604.

For more information, please visit www.jcmpo.org.

CONTACT:
Glenn Berry, transportation planning coordinator
Johnson City Metropolitan Transportation Planning Organization
(423)434-6272

CONTACT: Glenn Berry, transportation planning coordinator
Johnson City Metropolitan Transportation Planning Organization
(423)434-6272

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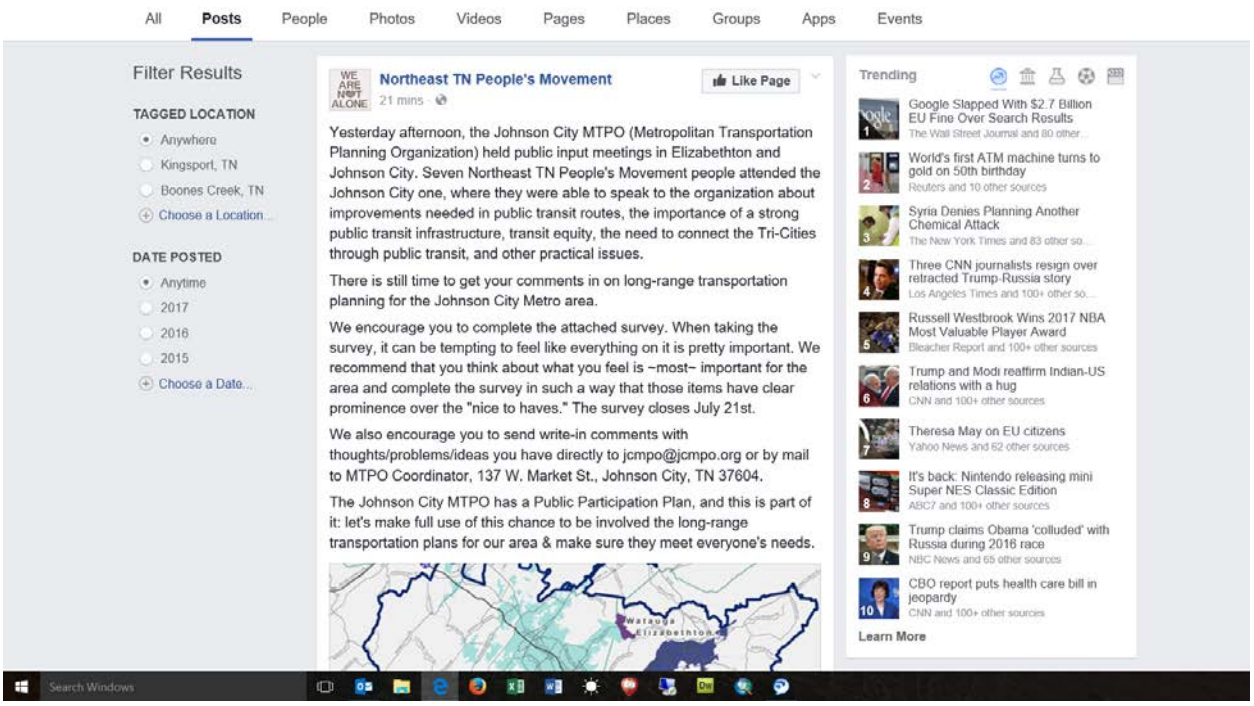

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Northeast TN People's Movement — Like Page
21 mins

Yesterday afternoon, the Johnson City MTPO (Metropolitan Transportation Planning Organization) held public input meetings in Elizabethton and Johnson City. Seven Northeast TN People's Movement people attended the Johnson City one, where they were able to speak to the organization about improvements needed in public transit routes, the importance of a strong public transit infrastructure, transit equity, the need to connect the Tri-Cities through public transit, and other practical issues.

There is still time to get your comments in on long-range transportation planning for the Johnson City Metro area.

We encourage you to complete the attached survey. When taking the survey, it can be tempting to feel like everything on it is pretty important. We recommend that you think about what you feel is ~most~ important for the area and complete the survey in such a way that those items have clear prominence over the "nice to haves." The survey closes July 21st.

We also encourage you to send write-in comments with thoughts/problems/ideas you have directly to jcmpo@jcmpo.org or by mail to MTPO Coordinator, 137 W. Market St., Johnson City, TN 37604.

The Johnson City MTPO has a Public Participation Plan, and this is part of it: let's make full use of this chance to be involved the long-range transportation plans for our area & make sure they meet everyone's needs.

Trending

1. Google Slapped With $2.7 Billion EU Fine Over Search Results
The Wall Street Journal and 80 other...
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Los Angeles Times and 100+ other so...
5. Russell Westbrook Wins 2017 NBA Most Valuable Player Award
Bleacher Report and 100+ other sources
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DATES: 6-18-2017

NOTICE OF PUBLIC MEETING SEEKING INPUT

Transportation plans for the Johnson City region are being developed and planning officials are seeking input from area residents. The Johnson City Metropolitan Transportation Planning Organization (MTPO) is working with local governments, businesses, non-profit organizations and the public to prepare plans, which will help establish transportation priorities for the cities and towns of Bluff City, Johnson City, Elizabethton, Jonesborough, Unicoi, and Watauga and portions of Washington, Carter, Unicoi and Sullivan counties. Two public meetings to gather important input from area [illegible] scheduled for **Monday, June 26, 2017 at the fol-**

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Teresa Hicks makes the oath that she is a Representative of The Johnson City Press, a daily newspaper published in Johnson City, in said County and State, and that the advertisement was published in said paper for 1 insertion (s) commencing on 6-18-2017 and ending on 6-18-2017.

Teresa Hicks

Sworn to and Subscribed before me this 6 19 2017
Month Day Year

CONNIE N. GUINN
STATE OF TENNESSEE
NOTARY PUBLIC
WASHINGTON COUNTY
MY COMMISSION EXPIRES 3-3-2021

Connie N. Guinn
Notary Public

My commission expires on 03/03/2021

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Elizabethton City Council Chamber 136 South Sycamore Street Elizabethton, TN 37643 11:00 a.m. to 1:00 p.m	Johnson City Commission Chamber 601 East Main Street Johnson City, TN 37601 4:00 p.m. to 6:00 P.M.

Citizens interested in sharing their input on needed roadway improvements as well as other transportation investments such as sidewalks, bike lanes, greenways and public transportation are encouraged to attend the meeting. The meeting is an open-house format so individuals can come and go when they want. Additionally, please visit our website located at http://www.jcmpo.org to find additional information on the project and to share your input by taking the online survey and providing comments on our interactive map. The public is also encouraged to send any comments to the MTPO via email at jcmpo@jcmpo.org or mail to MTPO Coordinator, 137 West Market Street, Johnson City, TN 37604.

AVISO DE REUNIÓN PÚBLICA BUSCANDO APORTE

Se están desarrollando planes de transporte para la región de Johnson City, y los funcionarios de planificación están buscando información de los residentes del área. La Organización de Planeación de Transportación Metropolitana de Johnson City (MTPO siglas en inglés) está trabajando con gobiernos locales, empresas, organizaciones no lucrativas, y el público para preparar planes que ayudarán a establecer prioridades de transporte para la ciudades y pueblos de Bluff City, Johnson City, Unicoi, y Watauga y porciones de los condados de Washington, Carter, Unicoi y Sullivan. Dos reuniones públicas para reunir información importante de los residentes del área están programadas para el **lunes, 26 de junio del 2017 en los siguientes lugares y horarios:**

Cámara del Consejo de la Ciudad de Elizabethton 136 South Sycamore Street Elizabethton, TN 37643 11:00 a.m. to 1:00 p.m.	Cámara de la Comisión de Johnson City 601 East Main Street Johnson City, TN 37601 4:00 p.m. to 6:00 p.m.

A los ciudadanos interesados en compartir sus opiniones sobre las mejoras necesarias en las carreteras, así como otras inversiones en transporte, tales como aceras, vías para bicicletas, trayectos verdes y transporte público se les anima a que asistan a la reunión. La reunión es de un formato abierto para que los individuos puedan ir y venir cuando quieran. Adicionalmente, visiten nuestro sitio web ubicado en el http://www.jcmpo.org para encontrar información adicional sobre el proyecto y para compartir sus aportes tomando la única encuesta y proporcionando comentarios en nuestro mapa interactivo. Se le anima al público a enviar cualquier comentario al MTPO por correo electrónico a jcmpo@jcmpo.org o por correo al Coordinador del MTPO, al 137 West Market Street, Johnson City, TN 37604.

JOHNSON CITY PRESS
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AD# 1399251

DATES: 12-17-2017

NOTICE OF JOHNSON CITY METROPOLITAN TRANSPORTATION PLAN
PUBLIC REVIEW PERIOD

The Johnson City Metropolitan Transportation Planning Organization (MTPO) is responsible for developing a regional Metropolitan Transportation Plan (MTP) that has a minimum 20-year horizon, includes a multi-modal element, a financial element, a list of cost-feasible projects, and meets certain federal transportation planning requirements. The MTPO has developed a draft 2045 Plan that includes recommendations for various transportation projects focused on safety, congestion mitigation, improved access, economic development, and mobility options. The Plan includes a significant amount of background data, forecasts of area de-

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Teresa Hicks
Teresa Hicks

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CONNIE N. GUINN
STATE OF TENNESSEE
NOTARY PUBLIC
WASHINGTON COUNTY
MY COMMISSION EXPIRES 3-3-2021

Connie N. Guinn
Notary Public

My commission expires on 03/03/2021

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The Johnson City Metropolitan Transportation Planning Organization (MTPO) is responsible for developing a regional Metropolitan Transportation Plan (MTP) that has a minimum 20-year horizon, includes a multi--modal element, a financial element, a list of cost-feasible projects, and meets certain federal transportation planning requirements. The MTPO has developed a draft 2045 Plan that includes recommendations for various transportation projects focused on safety, congestion mitigation, improved access, economic development, and mobility options. The Plan includes a significant amount of background data, forecasts of area development and traffic flow patterns, and anticipated funding that will provide the resources for implementing priority projects. Partners in developing this plan include the cities and towns of Bluff City, Johnson City, Elizabethton, Jonesborough, Unicoi, and Watauga, the counties of Washington, Carter, Unicoi, and Sullivan, the Tennessee Department of Transportation, the Federal Highway Administration, and the Federal Transit Administration. The Plan document will be available for public review ten days after this notice, by December 27, 2018.

A copy of the draft plan can be viewed during normal business hours at the Johnson City MTPO office, located in the Johnson City Transit Center at 137 West Market Street, Johnson City or on the Johnson City MTPO's website at www.jcmpo.org. This notice begins a 30-day review period which begins December 27, 2017 and is open until January 25, 2018. A public meeting will also be held to provide the public an opportunity to review the plan, ask questions, and/or make comments. The public meeting will be held January 11, 2018 from 4:00 p.m. until 6:00 p.m. at the Johnson City Transit Center's Training Room. Questions concerning the draft Plan, the public meeting, and the review process can be addressed by calling the MTPO offices at (423) 434-6272 or by emailing the MTPO at jcmpo@jcmpo.org.

AVISO DEL PERIODO DE REVISIÓN PÚBLICA DEL PLAN DE TRANSPORTE METROPOLITANO DE JOHNSON CITY

La Organización de Planificación de Transporte (MTPO, siglas en inglés) de Johnson City es responsable de desarrollar un Plan Regional de Transporte Metropolitano (MTP, siglas en inglés) que tenga un horizonte mínimo de 20 años, incluye un elemento multimodal, un elemento financiero, una lista de proyectos viables, y cumple con ciertos requisitos de planificación de transporte federal. El MTPO ha desarrollado un plan 2045 preliminar que incluye recomendaciones para diversos proyectos de transporte enfocados a la seguridad, mitigación de la congestión, acceso mejorado, desarrollo económico y opciones de movilidad. El plan incluye una cantidad significativa de datos antecedentes, pronósticos de desarrollo de áreas y patrones de flujo de tráfico, y financiamiento anticipado que proporcionarálos recursos para implementar los proyectos prioritarios. Los socios en el desarrollo de este plan incluyen las ciudades y los pueblos de Bluff City, Johnson City, Elizabethton, Jonesborough, Unicoi, y Watauga, los condados de Washington, Carter, Unicoi, y Sullivan, el Departamento de Transporte de Tennessee, y la Administración Federal de Tránsito. El documento del plan estará disponible para la revisión publica diez días después de este aviso, para el 27 de diciembre del 2018.

Una copia del plan preliminar se puede ver durante las horas normales de trabajo en la oficina de Johnson City MTPO (siglas en inglés), ubicada en el Centro de Tránsitode Johnson City en el 137 West Market Street, Johnson City o en el sitio Web de Johnson City MTOP www.jcmpo.org. Este aviso comienza un periodo de revisión de 30 días que comienza el 27 de diciembre del 2017 y estáabierto hasta el 25 de enero del 2018. También se celebraráuna reunión publica para proporcionar al público la oportunidad de revisar el plan, hacer preguntas y/o hacer comentarios. La reunión pública se llevaráa cabo el 11 de enero del 2018 a partir de las 4:00 p.m. hasta las 6:00 p.m. en la Sala de Entrenamiento del Centro de Tránsitode Johnson City. Las preguntas relativas al plan preliminar, la reunión pública, y el proceso de revisión pueden ser abordadas llamando a las oficinas del MTPO al (423) 434-6276 o enviando un correo electrónico al MTPO a jcmpo@jcmpo.org.

CITY OF JOHNSON CITY
OFFICE OF COMMUNITY RELATIONS
601 E. MAIN ST. • P.O. BOX 2150 • JOHNSON CITY, TN 37601
(423)434-6022 • WWW.JOHNSONCITYTN.ORG

June 20, 2017
For immediate release

CONTACT: Glenn Berry, transportation planning coordinator
Johnson City Metropolitan Transportation Planning Organization
(423)434-6272

Citizen input needed for transportation planning

The Johnson City Metropolitan Transportation Planning Organization (MTPO) is seeking input from citizens to help shape the Long Range Transportation Plan for our region. This plan includes Johnson City, Jonesborough, Bluff City, Elizabethton, Unicoi and Watauga as well as portions of Washington, Carter, Sullivan and Unicoi counties. It covers not only needed roadway improvements but also walking, biking and transit opportunities.

“This plan is the foundation for projects like the much needed improvements at the Boones Creek Exit on Interstate 26,” said Glenn Berry, transportation planning coordinator for the Johnson City MTPO. “I get calls throughout the year about transportation issues from trails to bridges. I look at a lot of issues, but I don’t always see them all. So this is the community’s opportunity to have input on the future of transportation in our region. After all, without a plan for the future, we’re just maintaining what we have in the present.”

Citizens can provide valuable feedback through a brief, five-minute online survey at https://www.surveymonkey.com/r/2045MTPlan through July 31. The MTPO also will host two public input sessions on Monday (June 26):

- Elizabethton City Council Chambers
  136 S. Sycamore St.
  Elizabethton, TN 37643
  11 a.m.-1 p.m.
- Johnson City Commission Chambers
  601 E. Main St.
  Johnson City, TN 37601
  4-6 p.m.

Additionally, comments are welcome in writing via email to jcmpo@jcmpo.org or mail to MTPO Coordinator, 137 W. Market St., Johnson City, TN 37604.

For more information, please visit www.jcmpo.org.

Mary Butler

From: Butler, Mary <marybutler2@johnsoncitytn.org>
Sent: Monday, June 26, 2017 8:47 AM
To: All Users
Subject: Help us plan for future transportation needs

The Johnson City Metropolitan Transportation Planning Organization (MTPO) is seeking input from the public to help shape the Long Range Transportation Plan for our region. This plan includes Johnson City, Jonesborough, Bluff City, Elizabethton, Unicoi and Watauga as well as portions of Washington, Carter, Sullivan and Unicoi counties. It covers not only needed roadway improvements but also walking, biking, and transit opportunities. This plan is a requirement in order to continue to bring federal funds to the area to support our projects.

You can provide valuable feedback through a brief, five-minute online survey at https://www.surveymonkey.com/r/2045MTPlan through July 31.

We will also be available today, Monday, June 26, from 4:00-6:00 p.m. in the Johnson City Commission Chambers, if you would like to come by in person and visit our open-house style public input session.

Sincerely,

Mary Butler | Transportation Planner
Johnson City MTPO | http://jcmpo.org
137 West Market Street | Johnson City, TN 37604
CapTel: 423.434.6277 | *Fax*: 423.434.6280

What transportation improvements do you want to see?

Johnson City Press | Zach Vance • Yesterday at 10:39 PM

Now is the time to offer your opinion as the Johnson City Metropolitan Transportation Organization begins to develop its upcoming Long Range Transportation Plan.

Beginning now through July 31, the organization is compiling citizens' input through an online survey to assist in constructing its Long Range Transportation Plan.

The plan encompasses Johnson City, Jonesborough, Bluff City, Elizabethton, Unicoi and Watauga, as well as portions of Washington, Carter, Sullivan and Unicoi counties.

Every five years, the Johnson City MTPO develops a federally required long-term plan that addresses the future of all modes of transportation based on land use, economic development, social needs and traffic demand. For a project to receive federal funding, it has to be included in the plan.

"This plan is the foundation for projects like the much-needed improvements at the Boones Creek Exit on Interstate 26," said Glenn Berry, transportation planning coordinator for the Johnson City MTPO.

"I get calls throughout the year about transportation issues from trails to bridges. I look at a lot of issues, but I don't always see them all. So this is the community's opportunity to have input on the future of transportation in our region. After all, without a plan for the future, we're just maintaining what we have in the present."

Berry said people living outside of the plan's boundaries that use local transportation roadways or amenities should still fill out the survey.

"You may live in Kingsport, but you may drive this area quite a bit," Berry said. "A lot of people from Carter County come over this way to work or shop or vice-versa. We'd like input from everyone."

As interest in the region's walking and bicycle trails continues to grow, the upcoming plan will likely address some popular pathway proposals.

Input will especially be important to gauge the interest surrounding specific projects, such as the Overmountain Victory Trail.

Recently, the U.S. Department of Interior and the National Park Service launched an effort to create a 30-mile walking and biking trail between Abingdon and Sycamore Shoals commemorating the route taken by the Overmountain Men during the Revolutionary War.

"I would really love to gauge what people's interests are. It's nothing against the Park Service coming in and saying, 'Yeah, we want to do this trail.' I think

that's great," Berry said. "The question I've got is is this something the local community wants? I think that they do, but again this is something I don't know for sure. If we get feedback from people saying this would be great, it gives me more ammunition as far as justifying something like that."

Other proposed trail projects the Johnson City MTPO wants to hear about are the Roan Mountain Tweetsie Trail extension, a trail connecting Jonesborough to Johnson City and the 25-mile State of Franklin Loop Trail.

Berry said a solid design is currently lacking for how and where to actually construct a trail between Jonesborough and Johnson City.

"It's one of those things, we've identified a need. We've not identified a route or how you would do it," Berry said.

Berry said the Tweetsie Trail extension all the way to Roan Mountain has also received some pushback from property owners along the route.

The long-discussed Boones Creek Exit 17 interchange will also be mentioned in the plan. Berry said any local IMPROVE Act projects funded with federal dollars will also be highlighted in the plan.

The brief, five-minute survey can be completed at www.surveymonkey.com/r/2045MTPlan.

On June 26, the Johnson City MTPO staff will also host two public input sessions where citizens can provide feedback.

The first meeting will be held at the Elizabethton City Council Chambers at 136 S. Sycamore St. from 11 a.m. to 1 p.m. The second meeting will be at the Johnson City Commission Chambers at 601 E. Main St. from 4 p.m. to 6 p.m.

Comments can also be submitted in writing via email to jcmpo@jcmpo.org or mail to MTPO Coordinator, 137 W. Market St., Johnson City, TN 37604.

Berry said the plan will be due on March 13, 2018.

To see the 2040 Long Range Transportation Plan, visit www.jcmpo.org.

You can help plan the next Tweetsie Trail project

Johnson City Press | Johnson City Press • Today at 12:00 AM

Johnson City Press • Today at 12:00 AM

The city of Johnson City has taken home a Tennessee Sustainable Transportation Award for the highly successful Tweetsie Trail. The honor was bestowed on the city last month by the Tennessee Department of Environment and Conservation, in partnership with the Tennessee Department of Transportation, for the rails-to-trails project that stretches along the 10-mile path of the former East Tennessee and Western North Carolina Railroad between Johnson City and Elizabethton.

The award recognizes the city's outstanding initiatives to improve the efficiency, accessibility, affordability and sustainability of transportation systems in Tennessee. The Tweetsie Trail provides opportunities for walking, running and bicycling.

It also offers access to many local public schools, East Tennessee State University and Sycamore Shoals State Park, as well as to local businesses and residential areas. Amenities along the trail include benches, informational signs describing the history and geology of the area, mile markers, pedestrian crosswalks, bike racks and pavilions.

Area residents already know the Tweetsie Trail is a true winner, and while it's good to see state officials recognize that, there's still more work to do. As Press staff writer Zach Vance reported recently, Johnson City residents have an opportunity to weigh in on the development of other recreational and transportation projects in our region.

The Johnson City Metropolitan Transportation Organization is now collecting comments from citizens regarding its Long Range Transportation Plan. The plan will cover areas of Johnson City, Jonesborough, Bluff City, Elizabethton, Unicoi and Watauga, as well as portions of Washington, Carter, Sullivan and Unicoi counties. You have until July 31 to submit your suggestions for a new walking trail, bicycle route or road project.

Officials say such comments are important to gauge the interest in a number of specific projects, including the proposed 30-mile Overmountain Victory Trail between Abingdon, Virginia, and Sycamore Shoals.

Comments can be submitted in writing via email to jcmpo@jcmpo.org or by mail to MTPO Coordinator, 137 W. Market St., Johnson City, TN 3760.

Mary Butler

From: JohnsonCityMTPO@groupspaces.com on behalf of Johnson City MTPO Email Contact Group <marybutler@jcmpo.org>
Sent: Friday, June 16, 2017 10:07 AM
To: JohnsonCityMTPO@groupspaces.com
Subject: Public input sought for Metropolitan Transportation Plan

E-mail displayed incorrectly? Read it in your browser

Johnson City MTPO Email Contact Group

Good morning, everyone.

The Johnson City MTPO is seeking public input for the 2045 update to the Metropolitan Transportation Plan (MTP), formerly called the Long Range Transportation Plan. This plan is important to everyone as it will lay the foundation for future transportation needs and investments. The study is not only about needed roadway improvements, but also about how to improve walking and biking opportunities, as well as transit, in the region.

We will hold two open-house format public meetings, so people can come and go when they want. We also have an online survey and interactive map for people to provide their input. Below is more information:

What: Open-House Public Meeting for Public Input on Future Transportations Needs

When: Monday, June 26, 2017

Website: http://jcmpo.org/mtp.html

Survey and Interactive Map:
https://www.surveymonkey.com/r/2045MTPlan

First Location:

Time: 11:00 a.m. - 1:00 p.m.

Where: Council Chambers, Elizabethton City Hall, 136 South Sycamore St, Elizabethton, TN

Second Location:

Time: 4:00 - 6:00 p.m.

Where: Commission Chambers, Johnson City Municipal Building, 601 East Main St, Johnson City, TN

We would appreciate the help in promoting these meetings and the survey to your colleagues and communities. If you have any questions, please let me know.

Sincerely,
Mary Butler
Transportation Planner

Johnson City Metropolitan Transportation Planning Organization (MTPO)

137 West Market Street
Johnson City, Tennessee 37604

Phone: (423) 434-6272
Email: jcmpo@jcmpo.org
Website: http://jcmpo.org

Mary Butler

From: JohnsonCityMTPO@groupspaces.com on behalf of Johnson City MTPO Email Contact Group <marybutler@jcmpo.org>
Sent: Wednesday, January 03, 2018 2:11 PM
To: JohnsonCityMTPO@groupspaces.com
Subject: Public Meeting on the draft 2045 Metropolitan Transportation Plan

E-mail displayed incorrectly? Read it in your browser

Johnson City MTPO Email Contact Group

The Johnson City MTPO would like to remind everyone that a public meeting will be held to provide the public the opportunity to review the 2045 Metropolitan Transportation Plan, ask questions and make comments. It will be held on Thursday, January 11, 2018 from 4:00-6:00 p.m. at the JCT Transit Center, located at 137 West Market Street, Johnson City, TN.

There are three options to view the draft Plan:

Direct Download on our website

View on DropBox

Paper Copy available at the Johnson City MTPO offices located in the JCT Transit Center, 137 West Market Street, Johnson City, TN

You may also submit comments on the draft Plan by the following ways:

Comment form on our website

By Fax: (423) 434-6280

By Email: jcmpo@jcmpo.org

By Twitter: @JohnsonCityMTPO

We appreciate your cooperation and input for this document.

Johnson City Metropolitan Transportation Planning Organization (MTPO)

137 West Market Street
Johnson City, Tennessee 37604

Phone: (423) 434-6272
Email: jcmpo@jcmpo.org
Website: http://jcmpo.org

1

PUBLIC MEETING ANNOUNCEMENT

Transportation Officials Want Your Input on the Region's




Walking, Biking, Transit, & Roads

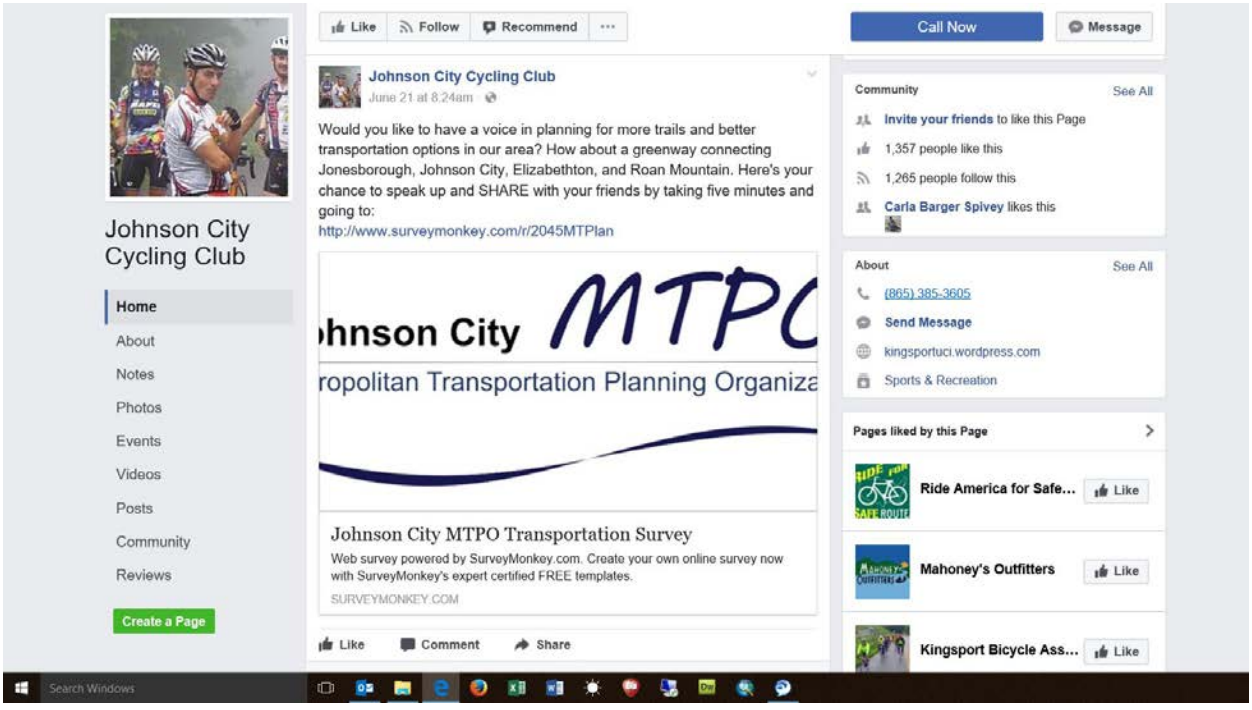
Transportation plans for the Johnson City region are underway and planning officials need your input. This plan is important to you as it will lay the foundation for future transportation investments in the cities and towns of Bluff City, Johnson City, Elizabethton, Jonesborough, Unicoi, and Watauga and portions of Washington, Carter, Unicoi and Sullivan counties. The study is not only about needed roadway improvements but also about how to improve walking and biking opportunities, as well as transit, in the region.

Two public meetings will be held on **Monday, June 26, 2017** at the following locations and times:

Elizabethton City Council Chamber	Johnson City Commission Chamber
136 South Sycamore Street	601 East Main Street
Elizabethton, TN 37643	Johnson City, TN 37601
11:00 a.m. to 1:00 p.m.	4:00 p.m. to 6:00 p.m.

Meetings are open-house format, so you can come and go when you want. If you can't make the meeting, check out the **online survey** and **interactive input map** for the plan and share your thoughts at www.jcmpo.org.

The Johnson City Metropolitan Transportation Planning Organization (MTPO), which is responsible for long range transportation planning for the region, will be conducting the meeting. Written comments and suggestions are also welcome via email at jcmpo@jcmpo.org or mail to Johnson City MTPO Coordinator - 137 West Market Street, Johnson City, TN 37604. More information about the Johnson City MTPO is available at www.jcmpo.org.



Public Meeting and Stakeholder Meeting Sign-in Sheets

Open-House Meeting for Public Input on
the Johnson City MTPO Metropolitan (Long Range) Transportation Plan
Monday, June 26, 2017 from 11:00 a.m. – 1:00 p.m.
Elizabethton City Hall, Council Chambers
Sign In Sheet

Name	Address, City, State	Email (Optional)
Mary Butler	137 W. Market St, JC, TN	marybutler@jcmpo.org
Jerone Kitchen	136 S Sycamore, Elizabethton	jk.kitchen@ci.elizabethton.tn.us
JOHANN COETZEE	2016 W G St Apt #1, Elizabethton	jcoetzee@cityofelizabethton.org
Teresa Woods	136 S. Sycamore, ELIZ. TN	twoods@elizabethton.org.
Jon Hartman	631 Golf Course Drive, Elizabethton, TN	jonhartman@gmail.com
Kayla Ferguson	RPM	
Preston Elliott	RPM	
Glenn Berry	Johnson City MTPO	

Open-House Meeting for Public Input on
the Johnson City MTPO Metropolitan (Long Range) Transportation Plan
Monday, June 26, 2017 from 4:00 – 6:00 p.m.
Johnson City Municipal Building, Commission Chambers
Sign In Sheet

Name	Address, City, State	Email (Optional)
Kayla Ferguson	RPM	
Preston Elliott	RPM	
Dennis Prater	Johnson City, TN 37601	
Tristan [illegible]	Johnson City TN 37604	
Phillip Durland	JC 37604	
Rose PEZZUTI DYER	Johnson City TN 37601	rose@dyer.me
Whitney Prater	Johnson City, TN 37601	
Angie Carrier	2117 Sinking Creek Rd Johnson City, TN 37601	
Becky Buchanan	130 Bowman Tr., JC, TN 37601	
CARLEEN CLAYBAKER	212 West Houston Ave., Johnson City TN 37604	
Franklin Montenegro	805 Cherway Dr., Johnson City, TN 37601	
JASON CARDER	MATTERN + CRAIG	
RANDY DODSON	" "	
Glenn KBrex	Johnson City MTPO, JC TN 37604	
Mary Butler	Johnson City MTPO, JC, TN	

Open-House Meeting for Public Input on
the Johnson City MTPO Metropolitan (Long Range) Transportation Plan
Monday, June 26, 2017 from 4:00 – 6:00 p.m.
Johnson City Municipal Building, Commission Chambers
Sign In Sheet

Name	Address, City, State	Email (Optional)
Renean Dubberley	1712 Jackson Feiman JC. TN	reneeandubberley@yahoo.com
Elisabeth Dubberley	"	"
Lisa Moss	2501 E. Lakeview Dr #8 J.C., TN	
Jim Hughes	1506 Woodland Ave 37601 JC TN	HUGHESGIH@EARTHLINK.NET
~~REMOVED~~		

Public Meeting on
the Johnson City MTPO Metropolitan (Long Range) Transportation Plan
Thursday, January 11, 2018 from 4:00 – 6:00 p.m.
Johnson City Transit Center, Training Room
Sign In Sheet

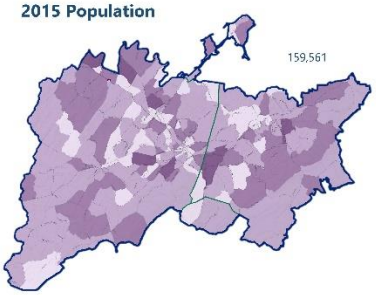
Name	Address, City, State	Email (Optional)
Mary Butler	Johnson City MTPO	
Glenn Berry	Johnson City MTAC	
Kayla Ferguson	KCI Technologies	
Preston Elliott	KCI Technologies	

Public Meeting Presentation and Materials

Population Changes

The Johnson City MTPO covers urbanized areas in Sullivan, Washington, Carter and Unicoi Counties within Tennessee. Population within the MTPO area is expected to grow by nearly 50,000 people by 2045, a 30% increase. This population growth is expected to occur primarily within municipal areas such as Johnson City and Elizabethton.

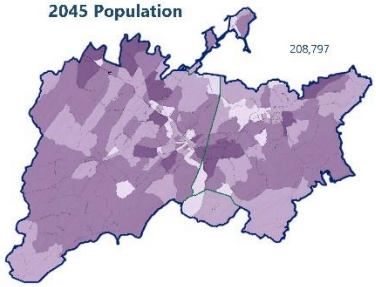
2015 Population



More People

Fewer People

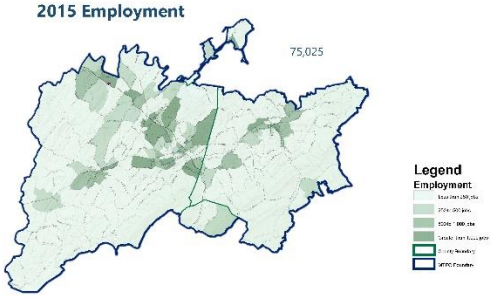
2045 Population



Employment Changes

Employment within the Johnson City MTPO area is expected to increase by approximately 40,000 jobs, which is a 53% increase, by 2045. This growth is expected to primarily occur in areas surrounding existing employment centers such as the I-26 and the US-231 corridors in Washington and Carter Counties.

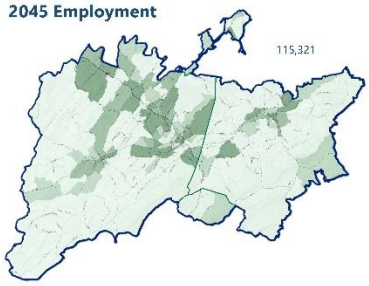
2015 Employment



More Jobs

Fewer Jobs

2045 Employment



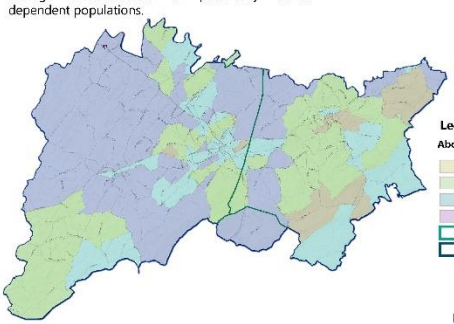
2045 Metropolitan Transportation Plan

Johnson City MTPO
Metropolitan Transportation Planning Organization

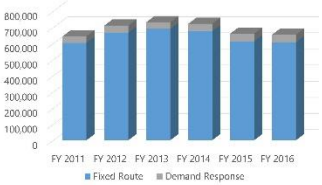
Johnson City's Transit Needs

Transit services operate in an effort to provide transportation options for those who may, by choice or limitation, not have access to a vehicle. In any urban area, there are concentrations of transit-dependent populations. Often, these population groups include those **over the age of 65**, those **households without access to a vehicle**, and those **families living on limited incomes**.

Using census data, the Johnson City MTPO area was analyzed to locate census block groups with above average concentrations of potentially transit-dependent populations.



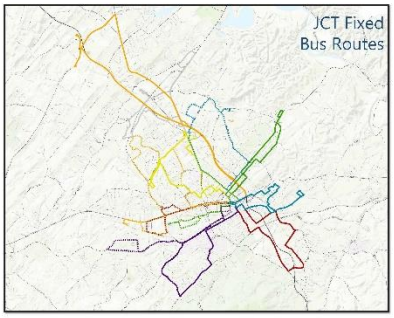
Ridership for both the fixed route and demand response services offered by JCT has seen moderate increases and decreases overall in the past 5 years.



Johnson City Transit Service

The Johnson City Transit service (JCT) provides fixed route and demand response transit services for residents within the Johnson City urbanized area. Routes provide access to key destinations such as apartment complexes and senior centers, medical facilities, shopping centers, employment centers, and downtown Johnson City. Information on specific routes and stop times is conveniently located on the JCT website.

Additionally, Northeast Tennessee Rural Public Transit (NET Trans) is the service provider of First Tennessee Human Resource Agency (FTHRA) with services to an eight-county region outside of JCT service area. NET Trans provided approximately 168,000 trips in 2016.



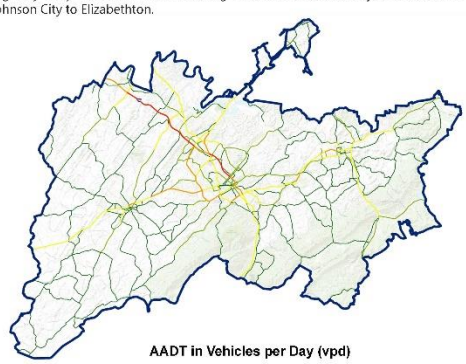
2045 Metropolitan Transportation Plan

Johnson City MTPO
Metropolitan Transportation Planning Organization

Roadway Level-of-Service

Annual average daily traffic, abbreviated AADT, is a measure used in transportation planning as a useful and simple measurement of how busy a road is. The Tennessee Department of Transportation collects this traffic data on the majority of major routes in the MTPO area, which provides a foundation for beginning to understand roadway congestion.

As seen in the map below, I-26 experiences the greatest traffic volumes in the MTPO area followed by major routes such as Market Street (Hwy 11E) leading to Jonesborough, State of Franklin Road circling the city, Bristol Highway (Hwy 19W), Roan Street leading north to Sullivan County, and Elk Avenue (Hwy 321) extending from Johnson City to Elizabethton.

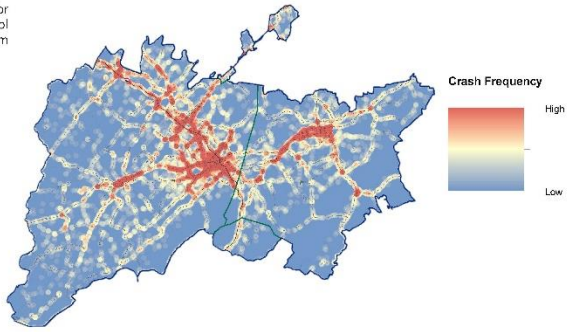


AADT in Vehicles per Day (vpd)

- Less than 5,000 vpd
- 5,000 to 10,000 vpd
- 10,000 to 25,000 vpd
- 25,000 to 50,000 vpd
- Greater than 50,000 vpd

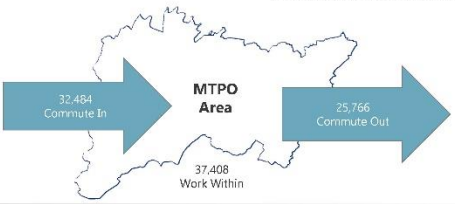
Safety Patterns

Using crash data from 2010-2015, crash frequencies were examined for the 4-county MTPO area. As expected, it can be seen that more crashes occur along the main corridors throughout the MTPO area such as US-321, State of Franklin Road, Roan Street, I-26, and others.



Commuting Patterns

Commuting patterns show that the counties in the Tri-Cities region are very co-dependent when it comes to employment.



Average commute times across the four counties are as follows:

- Carter – 22.8 minutes
- Unicoi – 22.0 minutes
- Sullivan – 21.7 minutes
- Washington – 20.9 minutes

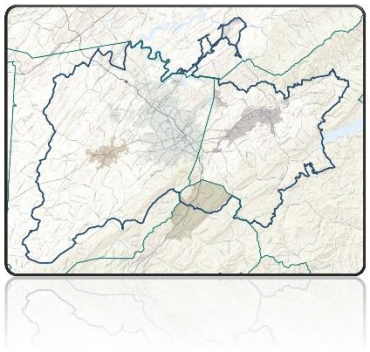
2045 Metropolitan Transportation Plan

Johnson City MTPO
Metropolitan Transportation Planning Organization

What is the MTPO?

Metropolitan Planning Organizations (MPOs) are policy-making bodies that represent urban areas with populations over 50,000. They were initially established with a federal process in the 1960s.

The Johnson City MTPO is one of 11 in the state of Tennessee. It was established in 1982 and is made up of representatives from local government and transportation authorities, which form a policy board and a technical board. The Johnson City MTPO includes six municipalities and portions of four counties.



Cities
Bluff City
Elizabethton
Johnson City
Jonesborough
Unicoi
Watauga

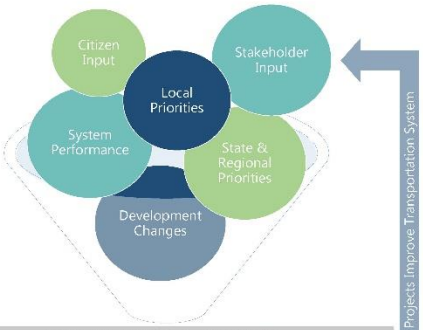
Counties
Carter
Sullivan
Unicoi
Washington

Purpose of the MTPO

The Johnson City MTPO is responsible for maintaining a continuing, cooperative and comprehensive transportation planning process. This process is used to plan for and allocate federal funding for transportation improvements. One of the main planning tasks carried out by the MTPO is the development of the Metropolitan Transportation Plan (MTP), which covers a 25-Year Horizon.

Purposes of the Metropolitan Transportation Plan

- Documents existing and future transportation conditions
- Includes a vision for the future in the region
- Guides transportation policies and federal transportation funds over the planning horizon
- Serves as a framework for transportation decisions and investments within the MTPO area



Metropolitan Transportation Plan (25-Year Plan)

Transportation Improvement Program (4-Year Capital Program)

Implemented Projects Improve Transportation System

2045 Metropolitan Transportation Plan

Johnson City MTPO
Metropolitan Transportation Planning Organization

MTPO Board Meeting Agendas and Materials

JOHNSON CITY MTPO
Minutes of the Executive Board / Executive Staff Meeting
Friday, March 17, 2017 at 10:30 a.m.
100 West Millard Street, Johnson City, TN
Johnson City Public Library, Jones Meeting Room

Executive Board Present
The Honorable Mayor Irene Wells, Town of Bluff City
Jon Hartman for the Honorable Mayor Curt Alexander, City of Elizabethton
The Honorable Mayor David Tomita, City of Johnson City, Chairman
Bob Browning for the Honorable Mayor Kelly Wolfe, Town of Jonesborough
The Honorable Mayor Johnny Lynch, Town of Unicoi
The Honorable Mayor Leon Humphrey, Carter County
The Honorable Mayor Daniel Eldridge, Washington County
Michelle Christian for the Honorable Governor Bill Haslam, State of Tennessee
John Deakins, Jr., Tennessee County Highway Officials Association

Executive Staff Present
The Honorable Mayor Irene Wells, Town of Bluff City
Jerome Kitchens, City of Elizabethton
M. Denis Peterson, City of Johnson City
Bob Browning, Town of Jonesborough
Mike Housewright, Town of Unicoi
Eldonna Janutolo, Johnson City Transit
John Deakins, Jr., Washington County Highway Department
Roger Colbaugh, Carter County Highway Department
Chris Craig, First Tennessee Development District
Michelle Christian, Tennessee Department of Transportation

Others Attending
The Honorable Jenny Brock, Vice Mayor of City of Johnson City
The Honorable Greg Lynch, Mayor of Unicoi County
Charlie Stahl, City of Johnson City
Glenn Berry, Johnson City MTPO
Mary Butler, Johnson City MTPO
Jeff Rawles, Johnson City Transit
Lisa Evans, Johnson City Transit
Bradley Osborne, Johnson City Transit
Liza Joffrion, Tennessee Department of Transportation
Mike Russell, Tennessee Department of Transportation
Trey Joiner, Tennessee Department of Transportation
Jason Cody, First Tennessee Human Resource Agency
Candace Gump, First Tennessee Human Resource Agency
Preston Elliott, RPM Transportation Consultants
Kayla Ferguson, RPM Transportation Consultants
Matthew Balogh, City of Elizabethton
Mike Potter, City of Elizabethton

Bill Albright, Kingsport MTPO
Troy Ebbert, Kingsport MTPO
Gary Taylor, Kingsport Area Transit Service
Kathy Whitaker, First Tennessee Area Agency on Aging and Disability
Stephanie Livingston, LDA Engineering
Calvin Clifton, Mattern & Craig
Joan Dauerty, Citizen
Charles "Vern" Dauerty, Citizen, VFW, Jonesborough Seniors Center
John R. White, Citizen, Jonesborough Seniors Center
Chris Sauls, Citizen, Jonesborough Seniors Center
Zach Vance, Johnson City Press
Karissa Winstead, WJHL

Summary of Motions:

- **Approved** – Minutes from November 4, 2016;
- **Approved – Resolution 2017-01** – Approved resolution to adopt the Johnson City Urbanized Area Coordinated Public Transit-Human Services Transportation Plan;
- **Approved – Resolution 2017-02** – Approved resolution to amend the Fiscal Years 2017-2018 Unified Planning Work Program (UPWP) to add additional Section 5303 funds;
- **Approved – Add Resolution 2017-03 to the agenda** – Approved to add the resolution to the agenda in support of allowing the First Tennessee Human Resource Agency's Executive Director to apply to the Federal Transit Administration to become a direct recipient of Section 5307 Federal Transit Administration funds in the Johnson City Urbanized Area;
- **Failed – Resolution 2017-03** – Approval of the resolution failed by a 3-5 roll call vote in support of allowing the First Tennessee Human Resource Agency's Executive Director to apply to the Federal Transit Administration to become a direct recipient of Section 5307 Federal Transit Administration funds in the Johnson City Urbanized Area;
- **Approved – Special Executive Board Meeting on March 27, 2017** – Approval of special meeting on Monday, March 27, 2017 at 11:00 a.m. to re-consider Resolution 2017-03, after public notice and review of possible solutions.

Call to Order: Meeting called to order at 10:35 a.m. by the Chairman, the Honorable Mayor David Tomita. Chairman Mayor Tomita proceeded with the invocation and recitation of the Pledge of Allegiance.

Agenda Item 1: Chairman Mayor Tomita proceeded to ask if there were any comments from the public. There were no comments from the public attending the meeting.

Agenda Item 2: The minutes from the November 4, 2016 meeting were reviewed.

Mr. Jerome Kitchens made a motion for the board to approve. The Honorable Mayor Irene Wells seconded the motion. All approved. **Motion carried.**

Agenda Item 3: Consider approval of Resolution 2017-01 to adopt the Johnson City Urbanized Area Coordinated Public Transit-Human Services Transportation Plan.

Mr. Glenn Berry introduced Preston Elliott and Kayla Ferguson of RPM Transportation Consultants. RPM is the consultant that prepared the Coordinated Plan. Mr. Elliott proceeded to show a presentation on the Coordinated Plan, describing the process. Two stakeholder meetings were held, along with stakeholder and public surveys. Mr. Kitchens asked whether the Coordinated Plan addressed NET Trans and the need for transportation throughout the urbanized area outside of Johnson City, if this covered the needs of Elizabethton and other areas and the gaps between those areas. Mr. Elliott said that it did and covered the strategies identified in the Coordinated Plan. Mr. Elliott mentioned Section 5310 could provide capital funding, as well as operating. Ms. Kayla Ferguson also said that Section 5310 could potentially provide funding for service to cover the transportation gaps in the region that was previously provided by NET Trans. Mr. Bob Browning asked if Section 5310 in the Coordinated Plan covered NET Trans and other organizations to be eligible for funding. The Jonesborough Senior Center tried to apply for Section 5310 and was not selected. Mr. Elliott responded that Section 5310 will provide funding for these types of projects. Mr. Browning wants to be sure that the state will provide smaller communities opportunities to get this funding, as it's very competitive. Mr. Elliott covered the strategies identified in the Coordinated Plan.

Mr. Berry also asked Mr. Elliott to give an update on the Long Range Transportation Plan. Ms. Ferguson passed out a handout with the schedule.

The Honorable Daniel Eldridge made a motion for the board to approve the resolution to adopt the Johnson City Urbanized Area Coordinated Public Transit – Human Services Transportation Plan. Section 5310 only allows for capital in the current year; however, the state may allow operating to be eligible in the next round. The Honorable Mayor Leon Humphrey seconded the motion. All approved. **Motion carried.**

Agenda Item 4: Consider approval of Resolution 2017-02 to amend the Fiscal Years 2017-2018 Unified Planning Work Program.

Mr. Berry proceeded to show a presentation detailing what is a Unified Planning Work Program (UPWP), the approval process and the details of the amendment. The document and amendments are on the Johnson City MTPO website. Three grant contracts have been received from the Tennessee Department of Transportation (TDOT) Multimodal Transportation Resources Division in the past couple of months. Ms. Liza Joffrion, the Director of TDOT Multimodal Transportation Resources Division, said that Multimodal has been a little behind in getting the contracts out. The new funds must be amended into

the UPWP. The Section 5303 funds can only be used for studies. It cannot be used for transit capital or operating. The funding will be used for a comprehensive operational analysis for Johnson City Transit and also to hire a consultant to assist with bus procurement.

Chairman Mayor Tomita asked how much is allocated for the consultants on these projects. Mr. Berry said we don't really know at this point but the bids are currently out and will be negotiated, with 90% of the cost provided by federal funds. Also Mr. M. Denis Peterson asked Mr. Berry to clarify the cost for hiring the consultant for assisting with bus procurement. Mr. Berry said the cost of the last consultant who assisted with bus procurement cost around $20,000.

Mr. Browning made a motion for the board to approve the resolution to amend the Fiscal Years 2017-2018 Unified Planning Work Program for the Johnson City MTPO. Ms. Michelle Christian seconded the motion. All approved. **Motion carried.**

Following the vote, Mr. Browning asked if the comprehensive operational analysis will consider expanding the service area of Johnson City Transit into Jonesborough. Mr. Berry said that yes, the service area would be part of the analysis.

Agenda Item 5: Other Business – Discussion of public transportation funding in the Johnson City Urbanized Area.

Mr. Berry opened the discussion on public transportation funding in the Johnson City Urbanized Area. Mr. Berry gave a presentation about urbanized areas and how they are formed by the Census Bureau. Ms. Joffrion mentioned that urban clusters are still considered rural. Mr. Berry also discussed how transit funding is determined by Federal Transit Administration (FTA) using the size of the urbanized areas and passed down through several entities. The question was asked if funding could be given to other recipients and Mr. Berry said he would get to that. He explained the difference between the terms designated recipient and direct recipient. Large urbanized areas over 200,000 in population are designated recipients who get their allocations directly from FTA. The Governor of the State of Tennessee, as the designated recipient for urbanized areas under 200,000, determines the re-allocation of Section 5307 Urbanized Area Formula funds. Mr. Berry said that NET Trans receives Section 5311 Rural Area Formula funds. Mr. Berry asked Ms. Joffrion if NET Trans was a sub-recipient to the state. Ms. Joffrion said yes, NET Trans is a sub-recipient. The funding comes to the state and NET Trans has a contract through the state. FTA will audit the state for sub-recipients.

Mr. Berry showed a letter from the Governor of Tennessee, dated December 30, 2010, to the FTA authorizing the City of Johnson City as a designated recipient to receive Section 5307 funds from FTA. The City of Johnson City is also a direct recipient, which means they can apply directly to FTA for funds. Ms. Joffrion said there can be multiple direct recipients in an urbanized area. Mr. Berry described the role of the MPO in transit planning. He said that the Johnson City MTPO is not the designated recipient. The MTPO receives the transit program of projects from the designated recipient and includes those projects in the Transportation Improvement Program (TIP). Ms. Joffrion said she was aware of FTA renewing designated recipient letters. She did not know if this included all urbanized areas or only the large urbanized areas. There was a question if there was a more recent designated recipient letter. Ms. Joffrion said the apportionment is already programmed into the TIP and that is what the Governor uses for the allocation to the small urbanized areas. Mr. Browning asked if the TIP would need to be adjusted to add the additional funding. Ms. Joffrion said that it would. She used an example of Knoxville that had multiple

recipients. Mr. Berry mentioned that Knoxville Transit is using a cooperative effort to include funding for East Tennessee Human Resource Agency (ETHRA) and the Knoxville Community Action Committee (CAC).

Mr. Berry turned over the presentation to Ms. Eldonna Janutolo. Ms. Janutolo presented the TDOT formula to re-allocate Section 5307 transit funding among the small urbanized areas in the State of Tennessee. Johnson City Transit (JCT) has recently lost funding after the new formula was put in place. The Job Access program went away and JCT is using New Freedom and general funds from the City of Johnson City to compensate for the loss of $180,000 to continue the current level of service. Mr. Browning asked if there is a reallocation of funds to another agency, will that money come out of the allocation to JCT. Ms. Janutolo said that it's up to TDOT but reallocating funds to include another agency could decrease the amount of funding to all of the agencies in the nine small urbanized areas. Ms. Joffrion said that it would depend on TDOT and how they allocate the funding. She said that not all of the areas are obligating all of their funds. She said that TDOT's formula has room for improvement. She complimented JCT for spending their allocation.

Mayor Humphrey made a motion for the Executive Board to approve a resolution authorizing the First Tennessee Human Resource Agency (FTHRA), of which NET Trans is a part, to file an application with FTA to receive Section 5307 funds (see Attachment 1). The Honorable Mayor Irene Wells seconded the motion. Mr. Berry said he did not receive the resolution until yesterday at 11:30 a.m. (Thursday, March 16, 2017) and has not had time to thoroughly review it. He had questions about the resolution. Chairman Mayor Tomita said the Board needs to make a motion first to add the resolution to the agenda.

Mayor Humphrey made a motion to add to the agenda the resolution in support of allowing the First Tennessee Human Resource Agency's Executive Director to apply to the Federal Transit Administration to become a direct recipient of Section 5307 Federal Transit Administration funds in the Johnson City Urbanized Area and bring it before the Executive Board. Mayor Wells seconded the motion. Chairman Mayor Tomita asked if Mr. Berry had any further discussion. All approved. **Motion carried**.

Ms. Joffrion informed the Board that there are stop gap funds. Chairman Mayor Tomita explained to the Board that the City Commission of the City of Johnson City has provided authorization to Johnson City Transit up to $25,000 for stop gap funding to provide transportation for critical medical trips for those in the urbanized area but outside the City of Johnson City. It was also stated that NET Trans was not the only agency in the state affected by this change, but that Johnson City was affected the most.

Mayor Humphrey said that time is of the essence to approve this resolution so that there is a continuation of service. Ms. Joffrion said that emergency stop gap funding was approved by TDOT Commissioner Schroer and awarded to FTHRA to provide service for 90 days, to cover the trips in the urbanized area, giving more time to find a solution. Mr. Jason Cody said the long term solution is to pass this resolution allowing them to apply for funding, and that Ms. Joffrion had mentioned to them that there is a potential for additional funding that could be provided to the area so that it would not affect JCT's funding.

Chairman Mayor Tomita asked Mr. Cody when NET Trans found out that they would no longer be able to provide trips within the urbanized areas using Section 5311 funds. Mr. Cody said that they found out about a year ago, after a TDOT audit. Chairman Mayor Tomita asked if the results of the audit were brought before a body like this Board. Mr. Cody said no. Mayor Wells asked why they could not go ahead and approve the resolution so that services will continue, out of concern for Bluff City's citizens. Chairman Mayor Tomita said that he appreciates the urgency but the Board just received this resolution and needs to consider who it will affect. Ms. Michelle Christian asked if enough notice was given on the resolution,

if due diligence had been met. Mayor Humphrey said he believed that due diligence had been met, that he had asked Ann Butterworth, legal counsel for the Tennessee Open Meetings Act, and she went over the organizational chart of the Board and did not feel that the Board was subject to the Act.

Mr. Peterson said that he appreciated the efforts of Mayor Humphrey contacting Ms. Butterworth; however, he feels that the Board may fall under the FTA. Mr. Peterson asked Ms. Candace Gump what was the cost to provide the service that NET Trans is performing right now on an annual basis, for any area. Mr. Cody said there are approximately 40,000 trips. Ms. Gump said the amount they are asking for is $500,000. Mr. Peterson explained that there is only a finite amount of funding and it is currently all being utilized. Somebody's funding and service is going to get cut in order to provide funding to somebody else. Mr. Peterson asked if operating is funded only at 50%. Ms. Joffrion said that the state provides 25% and 25% is local. Mr. Peterson calculated that of $500,000, $125,000 would need to be provided as local match from the rural areas. The local match is going to have to come from someone other than the City of Johnson City. Mr. Peterson also asked how long it will take for the application process to approve FTHRA as a direct recipient. Ms. Joffrion said approximately five months.

Mr. Browning asked if TDOT could look into this issue, if the resolution was needed, and if TDOT could find other funding sources to fill the gap and meet the need. Ms. Joffrion said that TDOT does not need the resolution to look at funding allocations; however, FTHRA does need the resolution in order to set up NET Trans as a direct recipient. Mr. Humphrey addressed that FTHRA has the match funding. Mr. Cody said that NET Trans has the infrastructure in place already to serve the clients, along with the match required and the fares will cover the additional cost. Fares are $3.00 to $5.00 a trip, so if that is multiplied by 40,000 trips, the fares will cover the match.

Mr. Mike Housewright asked what will happen if JCT loses funding. Ms. Janutolo explained that there is a process to cut service, that you can't just stop service and park the vehicles. JCT has been proactive in finding additional sources of funding. Other agencies have chosen not to pursue other funding because it can mean more work for the agency. Mr. Housewright asked if JCT can provide the service. Ms. Janutolo said that is a possibility.

Mr. Browning asked if Section 5310 funds can be used to connect service between the city limits of Johnson City to the town limits of Jonesborough, and then if TDOT has the ability to shift funding from Section 5311 to Section 5307 to be utilized to provide the service, specifically fixed route service to Jonesborough or Elizabethton. Ms. Gump said that their Section 5311 funds could not be shifted to Section 5307, but that TDOT could shift other Section 5307 funds in order to cover the loss of service. Mr. Browning asked Ms. Joffrion if TDOT has the flexibility to flex funding. Ms. Joffrion said that they do, but they would have to look at it.

Mayor Eldridge acknowledged the fact that there is a short window to find a solution. Mayor Eldridge stated that more Section 5307 money needs to be authorized to our area for each transit agency. There are many trips that need to be serviced and the issue needs to be resolved quickly. Mayor Eldridge asked if there was any interest for JCT to pick up the loss of service.

Ms. Janutolo explained to the Board that she recommended a solution that JCT be given the opportunity to provide the service. Ms. Janutolo would like for Kingsport, Bristol and Johnson City to sit down with TDOT and continue the conversation to find a solution. However, Ms. Janutolo explained she did not know the exact number of people who are impacted because the number of trips provided by NET Trans keeps changing.

Chairman Mayor Tomita stated to the Board that they have not had enough time to consider a resolution that has just been handed to them. Chairman Mayor Tomita said he understood the urgency level to this issue but do not want to make a mistake rushing through this.

Mayor Humphrey stated that approving the resolution to authorize filing an application with FTA will not stop the communication to find a solution. Mayor Humphrey also stated that even though this is a new issue and the members of the Board have just found out about it, time is of the essence.

Mr. Browning asked if Johnson City could sub-contract with NET Trans to provide the service. Ms. Janutolo said yes.

Chairman Mayor Tomita said that there are many moving parts to this process.

Mr. Cody said that he didn't think a contract was a valid solution. FTHRA had presented service contracts to the partnering transit agencies last year but never received a response.

Mr. Berry asked who would sign a contract to provide the service. Ms. Joffrion said that the MTPO Board is not approving the application but approving the resolution would start the process. Ms. Joffrion also mentioned that FTA will not award funding without a project being listed in the Transportation Improvement Program (TIP). Mr. Berry said that it is his understanding, that if FTHRA is awarded direct recipient status, that the two direct recipients would need to sit down with the MTPO Coordinator to discuss distribution of the funding.

Mr. Deakins stated if we approve the application, the recipients would have to discuss funding anyway and there is a potential for additional funding, so he did not see a problem in approving the application.

Ms. Christian asked what is the advertising policy for the MTPO Board. Mr. Berry said it was seven (7) days. Ms. Christian said that the Board may be in violation of the Public Participation Plan and federal Title VI regulations. The Board needs time to look at this. If it was approved, it could be nullified.

Mayor Humphrey said he believes that the notice requirement has been met, that at no time has the complete agenda been posted, and that the meeting was posted in a timely manner.

Chairman Mayor Tomita said he is willing to wait, advertise for seven days, and meet back to vote. Mr. Berry said the earliest they could meet would be on March 27th.

Mayor Humphrey stated he feels they should vote now, with the motion on the floor. Chairman Mayor Tomita asked if all were in favor of the motion. There were noes heard. Chairman Mayor Tomita asked for a roll call vote. The next page shows the record of the roll call vote. **The motion to approve Resolution 2017-03 failed in a 3-5-1 vote.**

Johnson City MTPO Executive Board

Roll Call Sheet

Meeting Date: March 17, 2017

Roll Call No. 1

Item No. 5

Resolution No. 2017-03

Moved: Mayor Leon Humphrey

Seconded: Mayor Irene Wells

Roll Call Vote (in alphabetical order):

Member	Proxy (if applicable)	Aye	No	Not Voting
Mayor Curt Alexander	Mr. Jon Hartman			✓
Mr. Johnny Deakins			✓	
Mayor Dan Eldridge			✓	
Governor Bill Haslam	Ms. Michelle Christian		✓	
Mayor Leon Humphrey		✓		
Mayor Johnny Lynch		✓		
Mayor Irene Wells		✓		
Mayor Kelly Wolfe	Mr. Bob Browning		✓	
Chairman Mayor David Tomita			✓	

Tally: 3 Ayes 5 Noes 1 Not Voting

Mayor Eldridge asked the Board if anyone would have a problem with a special meeting on Monday, March 27, to reconvene. No one objected. Mayor Eldridge made a motion for the Board to meet back at the Johnson City Public Library, if available, on Monday, March 27, 2017 at 11:00 a.m. to re-consider Resolution 2017-03, after public notice and review of the possible solutions. Ms. Christian seconded the motion. All agreed. **Motion carried.**

Mr. Peterson said that if $500,000 is awarded, he would like to propose that the funding be allocated to an urban-to-urban service.

Adjourn: There being no further business, the meeting was adjourned at 12:31 p.m.

Attachment 1

AUTHORIZING RESOLUTION

Resolution No. _____

Resolution authorizing the filing of applications with the Federal Transit Administration, an operating administration of the United States Department of Transportation, for federal transportation assistance authorized by 49 U.S.C. Chapter 53; title 23, United States Code, or other federal statutes administered by the Federal Transit Administration.

WHEREAS, the Federal Transit Administrator has been delegated authority to award federal financial assistance for a transportation project;

WHEREAS, the grant or cooperative agreement for federal financial assistance will impose certain obligations upon the applicant, and may require the applicant to provide the local share of the project cost;

WHEREAS, the applicant has or will provide all annual certifications and assurances to the Federal Transit Administration required for the project;

NOW, THEREFORE, BE IT RESOLVED BY Johnson City Urban Area Metropolitan Transportation Planning Organization Executive Board;

1. That the Executive Director is authorized to execute and file an application for federal assistance on behalf of First Tennessee Human Resource Agency with the Federal Transit Administration for federal assistance authorized by 49 U.S.C. Chapter 53, title 23, United States Code, or other federal statutes authorizing a project administered by the Federal Transit Administration. The Tennessee Department of Transportation, as the designated recipient has authorized First Tennessee Human Resource Agency to apply for Urbanized Area Formula Program Assistance per 49 U.S.C. 5307.

2. That Executive Director is authorized to execute and file with its applications the annual certifications and assurances and other documents the Federal Transportation Administration requires before awarding a federal assistance grant or cooperative agreement.

3. That Executive Director is authorized to execute grant and cooperative agreements with the Federal Transit Administration on behalf of First Tennessee Human Resource Agency.

11

CERTIFICATION

The undersigned duly qualified Chairman of the Executive Board acting on behalf of the Johnson City Urban Area Metropolitan Transportation Planning Organization Executive Board, certifies that the foregoing is a true and correct copy of a resolution adopted at a legally convened meeting of the Johnson City Urban Area Metropolitan Transportation Planning Organization Executive Board held on March 17th, 2017.

_____

Mayor David Tomita, Chairman of the Executive Board

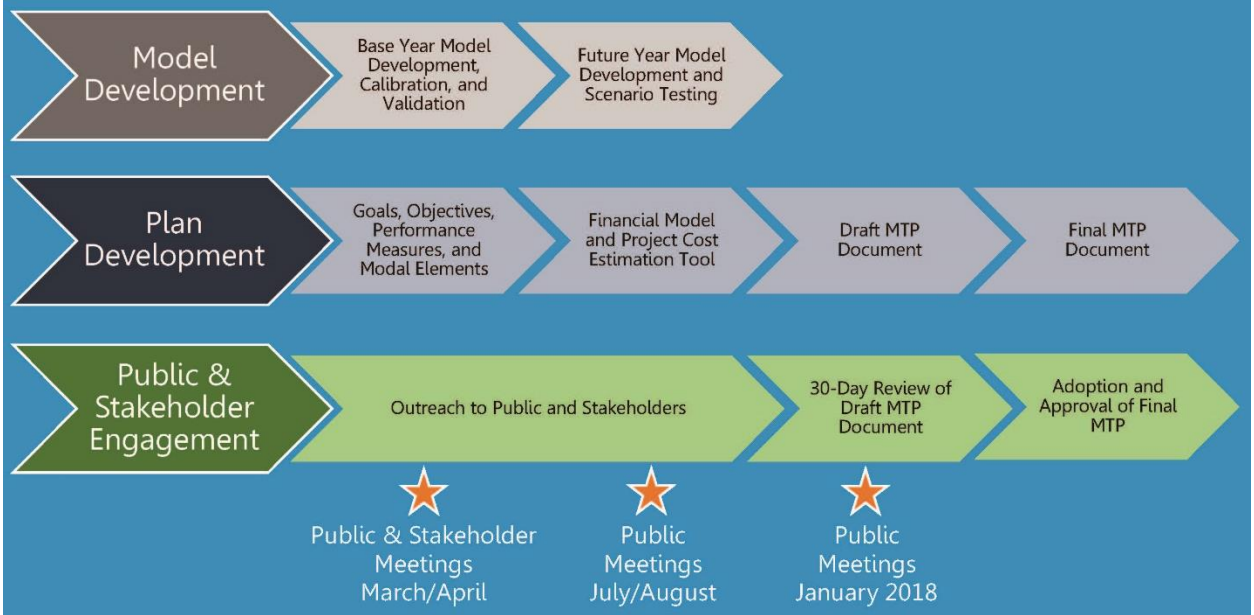
_____

Date

Johnson City MTPO
Metropolitan Transportation Planning Organization

Metropolitan Transportation Plan

Project Schedule



JOHNSON CITY MTPO
Minutes of the Executive Board / Executive Staff Meeting
Friday, August 18, 2017 at 10:00 a.m.
137 West Market Street, Johnson City, TN
Johnson City Transit Center, Training Room

Executive Board Present
The Honorable Mayor Irene Wells, Town of Bluff City
Jerome Kitchens for the Honorable Mayor Curt Alexander, City of Elizabethton
The Honorable Vice Mayor Jenny Brock for the Honorable Mayor David Tomita, City of Johnson City, Chairman
Bob Browning for the Honorable Mayor Kelly Wolfe, Town of Jonesborough
Mike Housewright for the Honorable Mayor Johnny Lynch, Town of Unicoi
The Honorable Mayor Leon Humphrey, Carter County
The Honorable Mayor Daniel Eldridge, Washington County
Troy Ebbert for the Honorable Governor Bill Haslam, State of Tennessee

Executive Board Not Present
John Deakins, Jr., Tennessee County Highway Officials Association

Executive Staff Present
The Honorable Mayor Irene Wells, Town of Bluff City
Jerome Kitchens, City of Elizabethton
M. Denis Peterson, City of Johnson City
Bob Browning, Town of Jonesborough
Mike Housewright, Town of Unicoi
Jeff Rawles for Eldonna Janutolo, Johnson City Transit
Roger Colbaugh, Carter County Highway Department
Chris Craig, First Tennessee Development District
Troy Ebbert, Tennessee Department of Transportation

Executive Staff Not Present
John Deakins, Jr., Washington County Highway Department

Others Attending
Glenn Berry, Johnson City MTPO
Mary Butler, Johnson City MTPO
Preston Elliott, RPM Transportation Consultants
Ashley Davies, Tennessee Department of Health
Cory Osborne, First Tennessee Development District
Jordan Livesay, Tennessee Department of Transportation
Matthew Balogh, City of Elizabethton
Angie Carrier, City of Johnson City
Matthew Marley, City of Johnson City
Jason Carder, Mattern & Craig

Summary of Motions:

- **Approved** – Minutes from March 17, 2017;
- **Approved** – Minutes from March 27, 2017;
- **Approved** – **Resolution 2017-04** – Approved resolution to adopt the Johnson City MTPO Fiscal Year 2018 Unified Planning Work Program.

Call to Order: Meeting called to order at 10:05 a.m. by the Chairman, the Honorable Vice Mayor Jenny Brock.

Agenda Item 1: Chairman Vice Mayor Brock proceeded to ask if there were any comments from the public. There were no comments from the public attending the meeting.

Agenda Item 2: The minutes from the March 17, 2017 meeting were reviewed.

The Honorable Mayor Daniel Eldridge made a motion for the board to approve. The Honorable Mayor Leon Humphrey seconded the motion. All approved. **Motion carried.**

Agenda Item 3: The minutes from the March 27, 2017 meeting were reviewed.

Mr. M. Denis Peterson made a motion for the board to approve. Mr. Bob Browning seconded the motion. All approved. **Motion carried.**

Agenda Item 4: Consider approval of Resolution 2017-04 to adopt the Fiscal Year 2018 Unified Planning Work Program.

Mr. Berry proceeded to show a presentation detailing past achievements from the FY 2017 Unified Planning Work Program (UPWP). Data has been received from the 3D elevation program and examples were given on how the data is being used. Elizabethton is using the building footprints to analyze a potential road widening project. Johnson City is completing an initial roadway survey. Mayor Eldridge said Washington County was using the data to assist in the development of industrial land. Mr. Berry said that it is important to document how this data was used. The cost was split among the jurisdictions, with 80% covered with federal funds.

Mr. Berry gave an update on Interstate 26 Exit 17 (Boones Creek Road Exit). He and other staff from Johnson City met with TDOT Region 1 staff in Knoxville. This project remains the top priority for the Johnson City MTPO and the Region 1 staff is finalizing the right-of-way phase and trying to secure funds for construction.

Mr. Troy Ebbert introduced Ms. Ashley Davies from the Tennessee Department of Health. Ms. Davies informed the Board of her role in the Health Department and that grant funds are available to the community for healthy initiatives. She would like to be more involved with resurfacing projects in the region and the possibility of adding a bike lane.

Mr. Berry thanked Ms. Davies for speaking and proceeded to update the Board on the State of Tennessee exploring the implementation of an E-TIP. He also explained the tasks for the upcoming fiscal year of 2018. The staff will continue to prioritize work on the Metropolitan Transportation Plan (formerly Long Range Transportation Plan), which is due in March 2018. The MTPO staff will also be working closely with TDOT staff on performance measures and performance targets. New planning rules will require that future projects contribute to meeting specific performance targets. The consensus of small MPOs in Tennessee is to adopt the state's performance targets. Some of the large urban areas may create their own targets. TDOT staff will present at the next meeting about this topic.

Mr. Berry explained that the MTPO staff will be updating the website to meet current web standards and make it more mobile friendly.

Mr. Troy Ebbert made a motion for the board to approve the resolution to adopt the Fiscal Year 2018 Unified Planning Work Program for the Johnson City MTPO. Mayor Wells seconded the motion. All approved. **Motion carried.**

Agenda Item 5: Other Business – Presentation by Mr. Preston Elliott, KCI Technologies, on the progress of the Metropolitan Transportation Plan (formerly Long Range Transportation Plan).

Mr. Elliott started off the presentation by giving an update on the progress that has been made so far on the Metropolitan Transportation Plan. He handed out the following documents (they are attached at the end of the minutes):

- Review of Goals & Objectives from 2040 Johnson City Transportation Plan to FAST Act Planning Factors and TDOT's LRTP
- Project Prioritization Criteria
- 2045 MTP Candidate Project List

The three documents were handed out so that members can take the time to review them before considering endorsing them at the next meeting. The goals and objectives will be updated to comply with the latest planning rules implemented in the FAST Act. The project prioritization criteria will rank the candidate projects according to their scores. Mr. Elliott also reviewed the projected population and employment growth in the region. Mr. Peterson questioned the low growth rate and that such a slow population growth will impact funding to the region. Mayor Eldridge said that the communities should be concerned about such a low rate. Mr. Elliott will provide more information at the next meeting about the methodology for calculating the growth rate.

Adjourn: There being no further business, the meeting was adjourned at 10:55 a.m.

2045 Johnson City MTPO Metropolitan Transportation Plan
Review of Goals & Objectives from 2040 Johnson City Transportation Plan to FAST Act Planning Factors and TDOT's LRTP

Proposed 2045 Johnson City Metropolitan Transportation Plan	FAST Act (2015)		TDOT's 25-Year Long-Range Transportation Plan (2015)
	Planning Factors	National Goals	Guiding Principles
Goal #1: Improve Safety and Security throughout the Transportation System of the MTPO Area • Objective: Encourage partnerships with other transportation and non-transportation agencies to enhance transportation safety and security • Objective: Reduce secondary traffic accidents • Objective: Establish initiatives (projects and programs) to improve the safety and security of vulnerable roadway users (e.g. pedestrians, cyclists, transit riders, and the young and old)	Increase the safety of the transportation system for motorized and non-motorized users. Increase the security of the transportation system for motorized and non-motorized users.	**Safety** – Achieve a significant reduction in traffic fatalities and serious injuries on all public roads.	**Maximize Safety and Security** Reduce injuries and fatalities in all modes of transportation; minimize construction-related safety incidents; improve disaster and extreme weather preparedness and incident response. **Build Partnerships for Sustainable and Livable Communities** Provide early and ongoing opportunities for broad public input on plans and programs; work closely with local public and private planning efforts; proactively coordinate land use and transportation planning to optimize the efficiency and long term viability of the transportation system.
Goal # 2: Reduce Traffic Congestion along Major Routes of the MTPO Area • Objective: Reduce travel delays between major areas of attractions in the MTPO study area • Objective: Seek cost-effective management solutions and new technologies as a means of addressing congestion, reducing transportation delay, improving travel time reliability, and improving system operations • Objective: Increase transit and other transportation demand management opportunities • Objective: Enhance the flow of raw materials and manufactured products	Increase accessibility and mobility of people and freight. Promote efficient system management and operation.	**Congestion reduction** - Achieve a significant reduction in congestion on the National Highway System. **System reliability** - Improve the efficiency of the surface transportation system.	**Provide for the Efficient Movement of People and Freight** Deliver an integrated, multimodal transportation system that optimizes the movement of people and goods by providing greater access to transportation services for all people and by building better connections among different modes of transportation.
Goal # 3: Promote Economic Growth and Livability by Enhancing the Transportation System for the MTPO Area • Objective: Maintain what we have – take a "state of good repair" approach to our community's transportation assets • Objective: Remove obstacles to economic growth through improved transportation facilities and the integration and connectivity of the transportation system, across and between modes, for people and freight thus allowing for the continued expansion of the business community • Objective: Promote alternative forms of transportation (such as walking, biking, and transit) where possible • Objective: Seek improvement options and strategies which minimize adverse impacts of surface transportation to historical, social, cultural, and natural environments, including stormwater impacts, and reduce transportation impacts on air-qualitypromote ~~reduction in transportation-related GHG emission~~	Emphasize the preservation of the existing transportation system. Improve the resiliency of the transportation system and reduce or mitigate stormwater impacts of surface transportation Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns.	**Infrastructure condition** - Maintain the highway infrastructure asset system in a state of good repair. **Environmental sustainability** - Enhance the performance of the transportation system while protecting and enhancing the natural environment.	**Preserve and Manage the Existing System** Balance maintenance and preservation needs with critical capacity enhancements and operations. Optimize system capacity and safety through cost effective management and new technologies. **Protect Natural, Cultural and Environmental Resources** Responsibly plan and manage the transportation system to maintain the integrity of communities, historical sites and the natural environment, minimize and mitigate impacts of transportation projects, and develop a transportation network that improves congestion and addresses air quality issues.
Goal # 4: Enhance Regional Access to and from the MTPO Area • Objective: Maintain and improve access to regional areas outside of the MTPO study area • Objective: Support transportation investments and policies that work to create jobs and improve access to people, tourism, places, and goods while embracing access management and corridor management strategies that preserve the long-term functionality of a roadway's capacity and safety • Objective: Strategically target transportation investments to areas supportive and conducive to growth and redevelopment initiatives	Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight. Enhance travel and tourism Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency.	**Freight movement and economic vitality** - Improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development. **Reduced project delivery delays** - Reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies' work practices.	**Support the State's Economy** Invest in transportation infrastructure that advances quality economic development and redevelopment, economic competitiveness, tourism, and increased access to people, places, goods and services within and through the State. **Emphasize Financial Responsibility** Provide accountability; maximize Tennessee's share of federal transportation funding; develop alternative funding strategies; select projects based on identified regional needs; allow flexibility in local management of projects where feasible

DRAFT 8/18/17

Project Prioritization Criteria
Draft 8/18/17

Priority	Total # Points	Measure
Safety 25 points	10	Number of auto crashes along segment in 5-year period
	5	Number of bike/pedestrian crashes along segment in 5-year period
	5	Existing crash rate along segment in 5-year period
	5	Low-volume, narrow streets (<10 foot lanes, <2000 AADT)
Operational Efficiency and Accessibility 35 points	10	LOS improved between 2015 and 2045 E+C
	5	LOS improved between 2045 E+C and 2045 vision run
	3	Traffic signal projects
	2	Creates parallel facility/system redundancy
	5	Improves existing facility without expanding (maintenance)
	5	Improves connectivity of system
	5	Population growth surrounding project 2015-2045
Active Transportation 15 points	5	Proximity to non-motorized trip generators
	5	Number of above average transit-dependent populations touched by project (65+, low income, zero-auto households)
	5	Project lies on route overlapping with non-motorized improvement
Environmental 10 points	5	Number of challenging areas the project touches (floodplains, historical areas, steep slopes, and parks)
	5	Negligible impact on air quality
Economic 15 Points	5	Percent of trucks in 2045 E+C
	3	Within 1/2 mile of freight-dependent industries
	5	Employment Growth Surrounding Project 2015-2045
	2	Improves access to identified tourist destinations

Johnson City MTPO
2045 MTP Candidate Project List

2045 MTP #	Jurisdiction	Roadway	From	To	Length (Miles)	Federal Functional Classification	Type of Improvement	Project Description
1	Johnson City	I-26	I-81	Bobby Hicks Hwy (SR 75)	3.7	Interstate	Widening	Widen existing 4 lane interstate to 6 lanes
2	Johnson City	I-26	Bobby Hicks Hwy (SR 75)	Boones Creek Rd (SR 354)	3.7	Interstate	Widening	Widen existing 4 lane interstate to 6 lanes
3	Johnson City	I-26	Boones Creek Rd (SR 354)	N Roan St (US 11E)	3.4	Interstate	Widening	Widen existing 4 lane interstate to 6 lanes
4	Johnson City	I-26	N Roan St (US 11E)	US 321	3.7	Interstate	Widening	Widen existing 4 lane interstate to 6 lanes
5	Johnson City	Boones Creek Rd (SR 354)	I-26	Highland Church Rd	2.2	Minor Arterial	Widening	Widen existing 2 lane roadway to 4 lanes
6	Washington Co	Boones Creek Rd (SR 354)	Highland Church Rd	Jonesborough Bypass	2.9	Minor Arterial	Widening	Widen existing 2 lane roadway to 4 lanes
7	Jonesborough	Boones Creek Rd (SR 354)	Jonesborough Bypass	US 11E	1.2	Minor Arterial	Widening	Widen existing 2 lane roadway to 4 lanes
8	Jonesborough	Jonesborough Bypass	Boones Creek Rd (SR 354)	US 11E	2.7	Proposed Minor Arterial	New Road	Construct new 3 lane roadway
9	Johnson City	N. State of Franklin (SR 381)	I-26	Knob Creek Rd	1.0	Principal Arterial	Widening	Widen existing 4 lane roadway to 6 lanes
10	Johnson City	N. State of Franklin (SR 381)	Knob Creek Rd	Indian Ridge Rd	1.9	Principal Arterial	Widening	Widen existing 4 lane roadway to 6 lanes
11	Elizabethton	Elk Ave (SR 67)	Hudson Dr	Lynn Ave (SR 400)	1.4	Principal Arterial	Widening	Widen existing 4/3 lane roadway to 6 lanes
12	Johnson City	Bristol Hwy (SR 34)	N. State of Franklin (SR 381)	MPO Planning Boundary	3.1	Principal Arterial	Widening	Widen existing 4/5 lane roadway to 6/7 lanes
13	Johnson City	Bristol Hwy (SR 34)	MPO Planning Boundary	US 19E	4.5	Principal Arterial	Widening	Widen existing 4 lane roadway to 6/7 lanes
14	Johnson City	Roy Marlin Rd	Gray Station Rd	Bobby Hicks Hwy (SR 75)	0.2	Proposed Collector	Reconstruction	Reconstruct 2 lane roadway addressing geometric issues to align with Roy Marlin Rd Ext
15	Washington Co	Roy Marlin Rd Extension	Bobby Hicks Hwy (SR 75)	Free Hill Rd	1.0	Proposed Collector	New Road	Construct new 2 lane roadway
16	Washington Co	Free Hill Rd	Free Hill Rd	Kingsport Hwy (SR 36)	1.6	Proposed Collector	Reconstruction	Reconstruct 2 lane roadway addressing geometric issues
17	Johnson City	Knob Creek Rd*	Mizpah Hills Dr	Boones Creek Rd (SR 354)	2.0	Proposed Collector	Widening	Widen existing 2 lane roadway to 4 lanes
18	Elizabethton	W G St	W Elk Ave (SR 67)	Hudson Dr	2.0	Minor Arterial	Reconstruction	Reconstruct existing 2 lane roadway to 3 lanes (adding a center turn lane)
19	Johnson City	Watauga Rd (SR 400)	Broadway St	E Fairview Ave	1.1	Minor Arterial	Reconstruction	Reconstruct existing 2 lane roadway to 3 lanes (adding a center turn lane)
20	Johnson City	Watauga Rd (SR 400)	E Fairview Ave	Piney Flats Rd	2.8	Minor Arterial	Reconstruction	Reconstruct existing 2 lane roadway to 3 lanes (adding a center turn lane)
21	Washington Co	Bob Jobe Rd Extension	Eastern Star Rd (Bob Jobe Rd)	Ford Creek Rd	1.5	Proposed Collector	Reconstruction	Reconstruct 2 lane roadway addressing geometric issues to align with Bob Jobe Rd Ext
22	Washington Co	Bob Jobe Rd Extension	Ford Creek Rd	Center St	1.5	Proposed Collector	New Road	Construct new 2 lane roadway
23	Johnson City	Hopper Rd	W Market St (US 11E)	Indian Ridge Rd	0.7	Proposed Collector	Reconstruction	Reconstruct 2 lane roadway addressing geometric issues to align with Hopper Rd Ext
24	Johnson City	Hopper Rd Ext	Indian Ridge Rd	Claude Simmons Rd	1.0	Proposed Collector	New Road	Construct new 2 lane roadway
25	Carter Co	Okolona Rd (SR 359)	I-26	Existing Okolona Rd (SR 359)	0.7	Collector	Realignment	Realign existing roadway with interchange to create better access
26	Washington Co	SR 75	Boonesboro Rd	MPO Planning Boundary (Lo. to US 11E)	12.8	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)
27	Washington Co	SR 81	Jonesborough Bypass	MPO Planning Boundary (Lo. to I-81)	14.4	Minor Arterial	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)
28	Washington Co	Leesburg Rd	US 11E	SR 81	3.9	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)
29	Washington Co	SR 353	SR 81	SR 107	13.3	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)
30	Washington Co	SR 91	SR 353	MPO Planning Boundary (Lo. to I-26)	13.8	Minor Arterial	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)
31	Carter Co	SR 361	SR 359	US 19E	8.9	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)
32	Carter Co	Okolona Rd (SR 359)	Milligan Hwy (SR 359)	S Roan St	1.6	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)
33	Washington Co	Highland Church	SR 75	Boones Creek Rd (SR 354)	5.3	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)

*Funded through the IMPROVE Act

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Projects Completed Since 2013 & Committed Improvements
(E+C Network)

Project/Route	From/To	Type of Improvement	Improvement Description	Funding Status	Project Status
Projects Completed Since Last Plan (2013)					
Kingsport Hwy (SR 36)	SR 354 (Boone Avenue) to SR 75	Widening	Widen from 2 lanes to 5 lanes	Complete	Complete
Gap Creek Road (SR 362)	SR 67 to SR 361	Reconstruction	Reconstruct & Widen - 2 and 3 lanes	Complete	Complete
SR 75	SR 36 to SR 357	Widening	Widen from 2 lanes to 5 lanes	Complete	Complete
Traffic Signal Upgrades in Johnson City	Intersection/Signalization improvements at 10 locations in Johnson City	Intersection Improvement	Install traffic signals	Complete	Complete
Johnson City ITS Project (formerly IVHS)	Select State Routes in Johnson City	ITS	Install ITS (sensors, TOC, etc) for Johnson City Traffic Division	Complete	Complete
I-26 Exit 13 (SR 75)	Exit 13 on I-26 (SR 75/ Suncrest Drive/ Bobby Hicks Highway) @ I-26	Interchange Improvement	Interchange modification	Complete	Complete
SR 91 and SR 67 Signals	Judge Ben Allen Road @ SR 91; SR 67 @ Williams Avenue in Elizabethton	Intersection Improvement	Install new traffic signals at intersections in Elizabethton	Complete	Complete
VA Hospital Connector	West Market Street to VA Hospital	New Roadway	Construct new 2-lane road	Complete	Complete
SR 81 & SR 353 (Jonesborough Five Points Intersection)	Intersection of SR 91 with SR 353 with Depot Street in Jonesborough	Intersection Improvement	Construct a roundabout	Complete	Complete
Committed Projects					
Traffic Circle for Mountainview Road	Intersection of Mountainview Road and Browns Mill Road	Intersection Improvement	Construct a roundabout	Funded thru CONST	Under CONST
SR 381	Intersection with Indian Ridge Road and Skyline Drive	Intersection Improvement	Add turn lanes, bridge rehabilitation	Funded thru CONST	Under CONST
I-26 Exit 24 (SR 67)*	Exit 24 on I-26 (SR 67/ University Parkway @ I-26)	Interchange Improvement	Ramp Modification	Funded thru CONST	Under CONST
Knob Creek Road Extension	West of Mizpah Hills Drive to Marketplace Boulevard	Reconstruction	Construct a new 5 lane (overpass crossing CSX RR)	Funded thru ROW in 2016	Under Development
SR 91 Extension (formerly Elizabethton Connector)*	US 19E to US 321	Reconstruction	Add center turn lane along the 4-lane undivided portion of West Elk Avenue from Holly Lane to North Roan Street. Sidewalk improvements and repaving of SR 91 from West G Street to SR 37 (US 19E).	Funded for ROW in 2020	Under Development
I-26 Exit 17 (SR 354)*	Exit 17 on I-26 (SR 354/ Boones Creek Road @ I-26)	Interchange Improvement	Interchange modification	Funded thru ROW. ROW to start in spring 2017	Under Development
Greenline Road	Intersection of Peoples Street and Greenline Road	Intersection Improvement	Intersection Improvement	Funded for PE in 2020*	Not Started
Adaptive Signal Control - Phase 1	SR 381 (North State of Franklin Road) from Knob Creek Road to Browns Mill Road	ITS	Add adaptive signal control on North State of Franklin Road in the vicinity of I-26 to improve safety and reduce congestion.	Funded for PE, CONST in 2019	Not Started
Adaptive Signal Control - Phase 2	Systemwide deployment throughout Johnson City	ITS	Deployment of real-time adaptive signal control technologies	Funded for PE, CONST in 2019	Not Started
Elk River Bridge Repair	Elk Avenue Bridge over Doe River	Bridge Rehabilitation	Repair and rehab the bridge due to deterioration	Funded for PE 2017, CONST in 2018	Under Development
Signalization Improvements for Elizabethton at Two Intersections	SR067 (Elk Ave) and Milligan Hwy/ SR067 (Elk Ave) and Mill St	Intersection Improvement	Upgrade and install traffic signals	Funding for PE, CONST in 2017	Under Development
SR 34 at Industrial Park Road Traffic Signal Upgrade	Intersection of SR 34 (US 11E/19W) at Industrial Park Road	Intersection Improvement	Upgrade traffic signals	Funded thru PE, CONST in 2017	Under Development
Traffic Signal for State of Franklin Road and Harris Dr	Intersection of SR 381 (State of Franklin Road) and Harris Dr	Intersection Improvement	Install traffic signals	Funded for PE, CONST in 2017	Under Development
Traffic Signal Upgrades at various locations in Elizabethton	Intersection/Signalization improvements at various intersections in Elizabethton	Intersection Improvement	Upgrade and install traffic signals at various intersections to improve safety and congestion	Funded for PE, CONST in 2018	Not Started
SR 34 at SR 354 in Jonesborough	Intersection of SR 34 (US 11E) and SR 354 (Boones Creek Road)	Intersection Improvement	Intersection Improvement	Funded thru ROW	Under Development
SR 34 Improvements	SR 34 (US 11E) from Jonesborough City Limits to Claude Simmons Road	Reconstruction	Install turn lanes	Funded thru PE-N	Under Development
Traffic Signal for SR 36 at Mountainview Road	SR 36 (North Roan Street) at Mountainview Road	Intersection Improvement	Install traffic signals	Funded thru PE-N	Under Development
SR 81 at Persimmon Ridge Road Improvements	SR 81 (West Main Street) at Persimmon Ridge Road	Intersection Improvement	Intersection Improvement	Funded thru PE-N	Under Development
SR 354 and Bugaboo Springs Road Improvements	SR 354 (Boones Creek Road) at Bugaboo Springs Road	Intersection Improvement	Intersection Improvement	Funded thru PE-N	Under Development

*Funded through the IMPROVE Act

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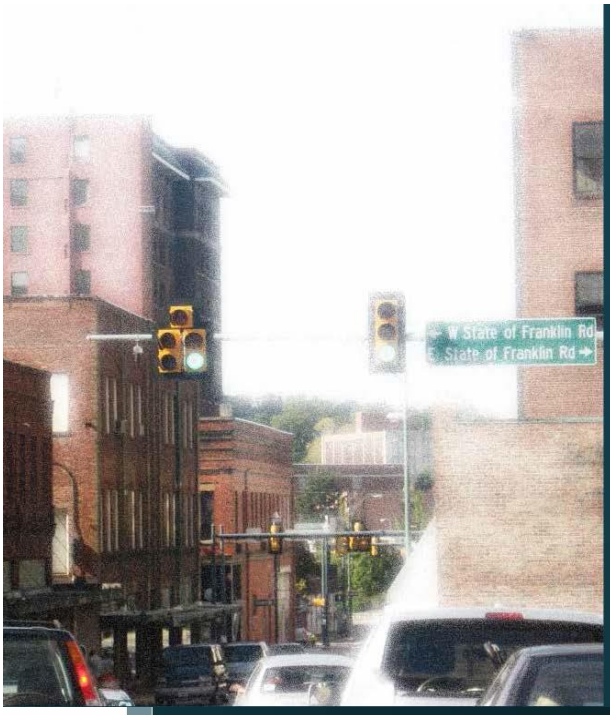


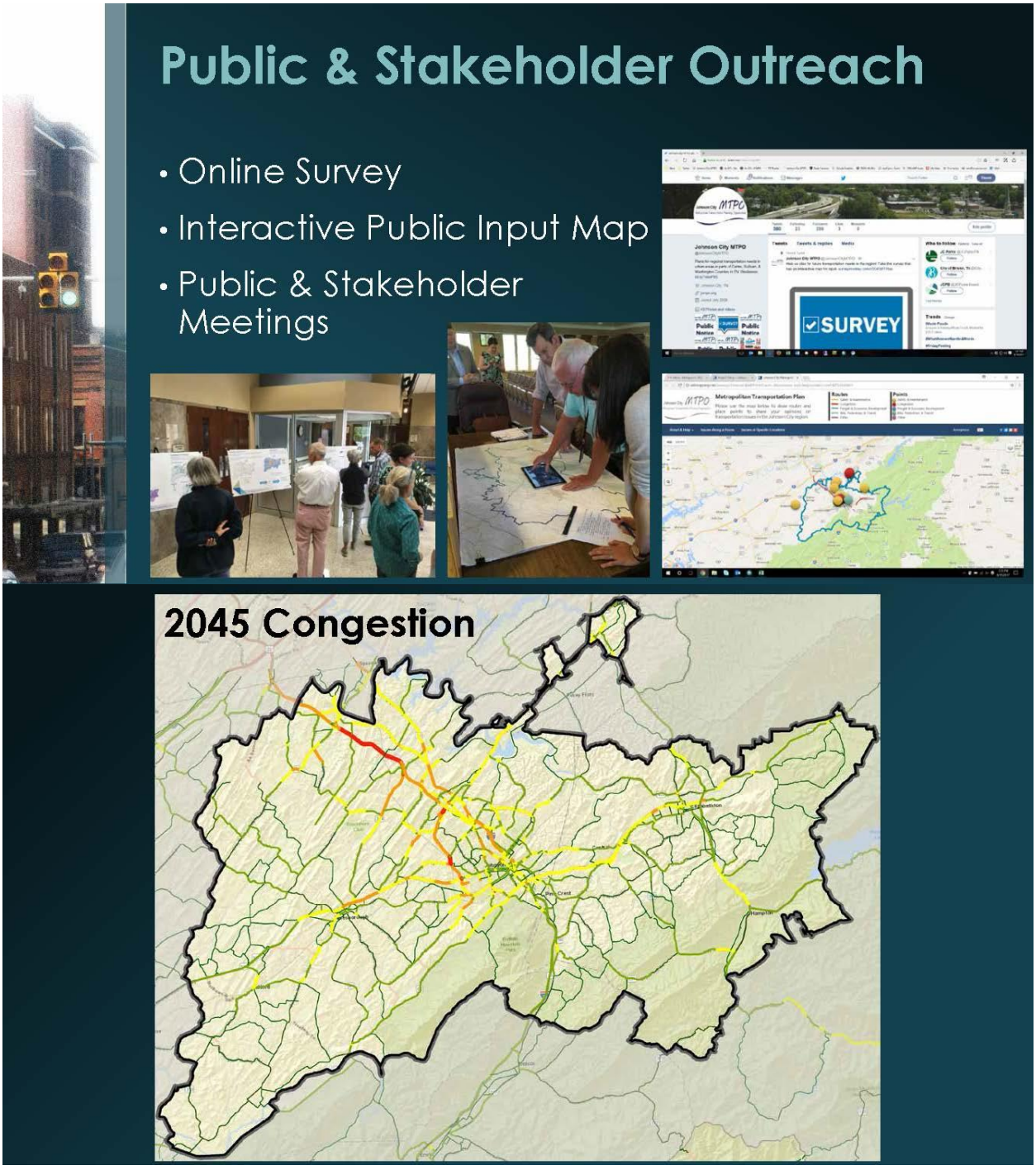
Johnson City MTPO

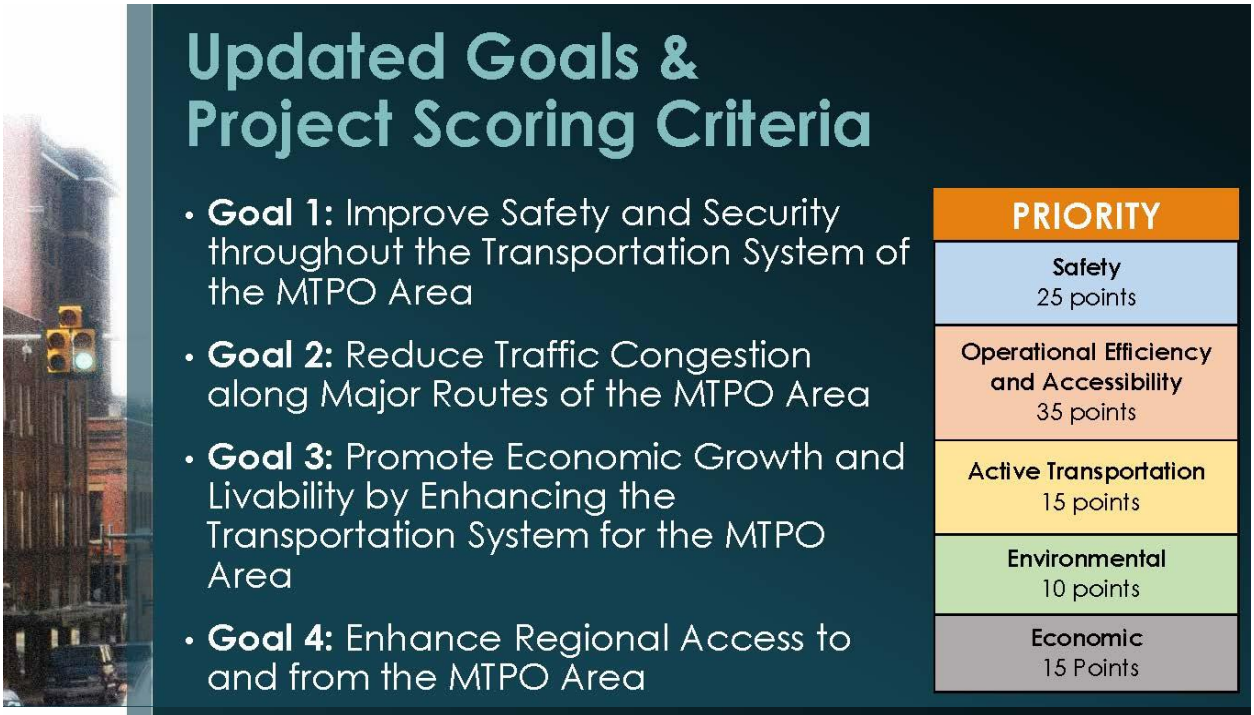
2045 Metropolitan Transportation Plan

Update

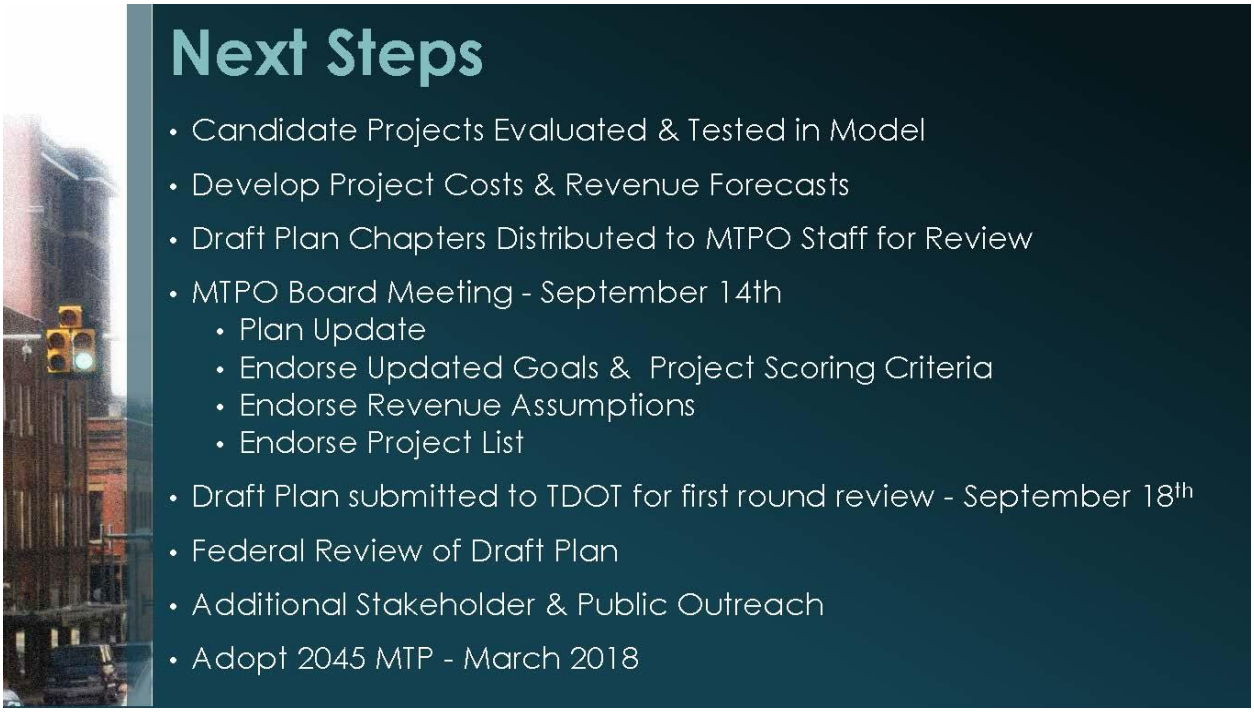
Overview

- Plan Update
- Model Status & Model Results
- Proposed MTP Updated Goals & Project Scoring Criteria
- Candidate Project List (draft)
- Next Steps


Public & Stakeholder Outreach
• Online Survey
• Interactive Public Input Map
• Public & Stakeholder Meetings
SURVEY
2045 Congestion


Updated Goals &
Project Scoring Criteria
• Goal 1: Improve Safety and Security throughout the Transportation System of the MTPO Area
• Goal 2: Reduce Traffic Congestion along Major Routes of the MTPO Area
• Goal 3: Promote Economic Growth and Livability by Enhancing the Transportation System for the MTPO Area
• Goal 4: Enhance Regional Access to and from the MTPO Area
PRIORITY
Safety
25 points
Operational Efficiency and Accessibility
35 points
Active Transportation
15 points
Environmental
10 points
Economic
15 Points


Candidate Projects & Programs
• Existing + Committed Projects
• Capital Improvement Projects
• Funding Programs
• Traffic Operations/ITS
• Safety
• Bridge
• Non-Motorized
• Transit
AHEAD


Next Steps
• Candidate Projects Evaluated & Tested in Model
• Develop Project Costs & Revenue Forecasts
• Draft Plan Chapters Distributed to MTPO Staff for Review
• MTPO Board Meeting - September 14th
• Plan Update
• Endorse Updated Goals & Project Scoring Criteria
• Endorse Revenue Assumptions
• Endorse Project List
• Draft Plan submitted to TDOT for first round review - September 18th
• Federal Review of Draft Plan
• Additional Stakeholder & Public Outreach
• Adopt 2045 MTP - March 2018

JOHNSON CITY MTPO
Minutes of the Executive Board / Executive Staff Meeting
Thursday, September 14, 2017 at 10:00 a.m.
137 West Market Street, Johnson City, TN
Johnson City Transit Center, Training Room

DRAFT

Executive Board Present

Jerome Kitchens for the Honorable Mayor Curt Alexander, City of Elizabethton
The Honorable Mayor David Tomita, City of Johnson City, Chairman
Bob Browning for the Honorable Mayor Kelly Wolfe, Town of Jonesborough
The Honorable Mayor Daniel Eldridge, Washington County
Michelle Christian for the Honorable Governor Bill Haslam, State of Tennessee
John Deakins, Jr., Tennessee County Highway Officials Association

Executive Board Not Present
The Honorable Mayor Irene Wells, Town of Bluff City
The Honorable Mayor Johnny Lynch, Town of Unicoi
The Honorable Mayor Leon Humphrey, Carter County

Executive Staff Present
Jerome Kitchens, City of Elizabethton
Bob Browning, Town of Jonesborough
M. Denis Peterson, City of Johnson City
John Deakins, Jr., Washington County Highway Department
Chris Craig, First Tennessee Development District
Michelle Christian, Tennessee Department of Transportation

Executive Staff Not Present
The Honorable Mayor Irene Wells, Town of Bluff City
Mike Housewright, Town of Unicoi
Eldonna Janutolo, Johnson City Transit
Roger Colbaugh, Carter County Highway Department

Others Attending
Glenn Berry, Johnson City MTPO
The Honorable Ralph Van Brocklin, Johnson City Commission
Sean Santalla, Federal Highway Administration, Tennessee Division
Mike Russell, Tennessee Department of Transportation
Troy Ebbert, Tennessee Department of Transportation
Charlie Stahl, City of Johnson City
Mike Potter, City of Elizabethton
Shauna Crowe, Johnson City Transit
Candace Gump, First Tennessee Human Resource Agency – NET Trans
Jason Carder, Mattern & Craig
Preston Elliott, KCI Technologies (RPM Transportation Consultants)

Summary of Motions:

- **Approved** – Minutes from August 18, 2017;

- **Endorsed** – Approved endorsement of items concerning the 2045 Metropolitan Transportation Plan:
    - Goals & Objectives
    - Revenue Assumptions
    - Project Prioritization Criteria
    - 2045 MTP Candidate Project List

Call to Order: Meeting called to order at 10:02 a.m. by the Chairman, the Honorable Mayor David Tomita.

Agenda Item 1: Chairman Mayor Tomita proceeded to ask if there were any comments from the public. There were no comments from the public attending the meeting.

Agenda Item 2: The minutes from the August 18, 2017 meeting were reviewed.

The Honorable Mayor Daniel Eldridge made a motion for the board to approve. Mr. Bob Browning seconded the motion. All approved. **Motion carried.**

Agenda Item 3: Consider approval of endorsements of the following items that concern the 2045 Metropolitan Transportation Plan (MTP):

- Goals and Objectives
- Revenue Assumptions
- Project Prioritization Criteria
- 2045 MTP Candidate Project List

Mr. Berry proceeded to introduce Mr. Preston Elliott of KCI Technologies (formerly RPM), who gave a brief presentation. Mr. Elliott reviewed the goals and objectives and also reviewed the project scoring criteria. Mr. Elliott passed out handouts on future revenue and then went over revenue forecasts for highways and transit funding. Mr. Elliott then reviewed the candidate projects to include in the MTP, including transit projects. The members of the Board asked questions about several of the proposed projects. Mr. Ebbert asked Ms. Candace Gump of the First Tennessee Human Resource Agency how the grantee application with the Federal Transit Administration was progressing. Ms. Gump responded that two segments of the application had been approved and that two more were pending. Mr. Elliott then covered the next steps in the progress of updating the 2045 MTP. A draft is scheduled to be submitted to TDOT by the end of the month to begin the review process.

Ms. Michelle Christian made a motion for the board to endorse the items for the 2045 MTP. Mr. Johnny Deakins, Jr. seconded the motion. All approved. **Motion carried.**

Agenda Item 4: Presentation by staff from the TDOT Office of Community Transportation on new federal regulations for safety performance measures and targets

Mr. Sean Santalla gave a presentation that provided an introduction of the requirements of performance measures as they support the seven national performance goals that were established in MAP-21 legislation in 2012. Now that FHWA has published the final rules, the states must set targets that support the performance measures. The states then coordinate with MPOs, who either support the state's performance targets or set their own targets. Planning documents that are amended or updated by the MPOs, such as the MTP and the TIP, after May 27, 2018 must include projects and figures that support achieving the targets.

Mr. Troy Ebbert then gave a presentation about safety performance targets, the first of the measures to be implemented. Data on traffic fatalities and serious injuries, as defined, must be gathered on all public roads within the state of Tennessee. Mr. Ebbert explained the process to determine targets and how to measure progress toward meeting those targets. TDOT will work with the MPOs to assist with establishing targets and sharing data. The MPOs must report data on the targets to TDOT, who will report them to FHWA by February 27, 2018.

Agenda Item 5: Other Business

Mr. Berry showed the Executive Board a video on truck platooning, an automated and connected vehicle technology that was discussed briefly at the previous meeting. The video is online here - http://www.youtube.com/watch?v=tLWGGponorA.

Adjourn: There being no further business, the meeting was adjourned at 11:15 a.m.

2045 Johnson City MTPO Metropolitan Transportation Plan

Review of Goals & Objectives from 2040 Johnson City Transportation Plan to FAST Act Planning Factors and TDOT's LRTP

Proposed 2045 Johnson City Metropolitan Transportation Plan	FAST Act (2015)		TDOT's 25-Year Long-Range Transportation Plan (2015) Guiding Principles
	Planning Factors	National Goals	
Goal #1: Improve Safety and Security throughout the Transportation System of the MTPO Area • Objective: Encourage partnerships with other transportation and non-transportation agencies to enhance transportation safety and security • Objective: Reduce secondary traffic accidents • Objective: Establish initiatives (projects and programs) to improve the safety and security of vulnerable roadway users (e.g. pedestrians, cyclists, transit riders, and the young and old)	Increase the safety of the transportation system for motorized and non-motorized users. Increase the security of the transportation system for motorized and non-motorized users.	**Safety** – Achieve a significant reduction in traffic fatalities and serious injuries on all public roads.	**Maximize Safety and Security** Reduce injuries and fatalities in all modes of transportation; minimize construction-related safety incidents; improve disaster and extreme weather preparedness and incident response. **Build Partnerships for Sustainable and Livable Communities** Provide early and ongoing opportunities for broad public input on plans and programs; work closely with local public and private planning efforts; proactively coordinate land use and transportation planning to optimize the efficiency and long term viability of the transportation system.
Goal # 2: Reduce Traffic Congestion along Major Routes of the MTPO Area • Objective: Reduce travel delays between major areas of attractions in the MTPO study area • Objective: Seek cost-effective management solutions and new technologies as a means of addressing congestion, reducing transportation delay, improving travel time reliability, and improving system operations • Objective: Increase transit and other transportation demand management opportunities • Objective: Enhance the flow of raw materials and manufactured products	Increase accessibility and mobility of people and freight. Promote efficient system management and operation.	**Congestion reduction** - Achieve a significant reduction in congestion on the National Highway System. **System reliability** - Improve the efficiency of the surface transportation system.	**Provide for the Efficient Movement of People and Freight** Deliver an integrated, multimodal transportation system that optimizes the movement of people and goods by providing greater access to transportation services for all people and by building better connections among different modes of transportation.
Goal # 3: Promote Economic Growth and Livability by Enhancing the Transportation System for the MTPO Area • Objective: Maintain what we have – take a "state of good repair" approach to our community's transportation assets • Objective: Remove obstacles to economic growth through improved transportation facilities and the integration and connectivity of the transportation system, across and between modes, for people and freight thus allowing for the continued expansion of the business community • Objective: Promote alternative forms of transportation (such as walking, biking, and transit) where possible • Objective: Seek improvement options and strategies which minimize adverse impacts of surface transportation to historical, social, cultural, and natural environments, including stormwater impacts, and reduce transportation impacts on air-quality~~promote reductions in transportation-related GHG emissions~~	Emphasize the preservation of the existing transportation system. Improve the resiliency of the transportation system and reduce or mitigate stormwater impacts of surface transportation Protect and enhance the environment, promote energy conservation, improve the quality of life, and promote consistency between transportation improvements and State and local planned growth and economic development patterns.	**Infrastructure condition** - Maintain the highway infrastructure asset system in a state of good repair. **Environmental sustainability** - Enhance the performance of the transportation system while protecting and enhancing the natural environment.	**Preserve and Manage the Existing System** Balance maintenance and preservation needs with critical capacity enhancements and operations. Optimize system capacity and safety through cost effective management and new technologies. **Protect Natural, Cultural and Environmental Resources** Responsibly plan and manage the transportation system to maintain the integrity of communities, historical sites and the natural environment, minimize and mitigate impacts of transportation projects, and develop a transportation network that improves congestion and addresses air quality issues.
Goal # 4: Enhance Regional Access to and from the MTPO Area • Objective: Maintain and improve access to regional areas outside of the MTPO study area • Objective: Support transportation investments and policies that work to create jobs and improve access to people, tourism, places, and goods while embracing access management and corridor management strategies that preserve the long-term functionality of a roadway's capacity and safety • Objective: Strategically target transportation investments to areas supportive and conducive to growth and redevelopment initiatives	Enhance the integration and connectivity of the transportation system, across and between modes, for people and freight. Enhance travel and tourism Support the economic vitality of the metropolitan area, especially by enabling global competitiveness, productivity, and efficiency.	**Freight movement and economic vitality** – Improve the national freight network, strengthen the ability of rural communities to access national and international trade markets, and support regional economic development. **Reduced project delivery delays** - Reduce project costs, promote jobs and the economy, and expedite the movement of people and goods by accelerating project completion through eliminating delays in the project development and delivery process, including reducing regulatory burdens and improving agencies' work practices.	**Support the State's Economy** Invest in transportation infrastructure that advances quality economic development and redevelopment, economic competitiveness, tourism, and increased access to people, places, goods and services within and through the State. **Emphasize Financial Responsibility** Provide accountability; maximize Tennessee's share of federal transportation funding; develop alternative funding strategies; select projects based on identified regional needs; allow flexibility in local management of projects where feasible

Project Prioritization Criteria
Draft 8/18/17

Priority	Total # Points	Measure
Safety 25 points	10	Number of auto crashes along segment in 5-year period
	5	Number of bike/pedestrian crashes along segment in 5-year period
	5	Existing crash rate along segment in 5-year period
	5	Low-volume, narrow streets (<10 foot lanes, <2000 AADT)
Operational Efficiency and Accessibility 35 points	10	LOS improved between 2015 and 2045 E+C
	5	LOS improved between 2045 E+C and 2045 vision run
	3	Traffic signal projects
	2	Creates parallel facility/system redundancy
	5	Improves existing facility without expanding (maintenance)
	5	Improves connectivity of system
	5	Population growth surrounding project 2015-2045
Active Transportation 15 points	5	Proximity to non-motorized trip generators
	5	Number of above average transit-dependent populations touched by project (65+, low income, zero-auto households)
	5	Project lies on route overlapping with non-motorized improvement
Environmental 10 points	5	Number of challenging areas the project touches (floodplains, historical areas, steep slopes, and parks)
	5	Negligible impact on air quality
Economic 15 Points	5	Percent of trucks in 2045 E+C
	3	Within 1/2 mile of freight-dependent industries
	5	Employment Growth Surrounding Project 2015-2045
	2	Improves access to identified tourist destinations

Projects Completed Since 2013 & Committed Improvements
(E+C Network)

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*Funded through the IMPROVE Act

Johnson City MTPO
2045 MTP Candidate Project List

2045 MTP #	Jurisdiction	Roadway	From	To	Length (Miles)	Federal Functional Classification	Type of Improvement	Project Description
1	Johnson City	I-26	I-81	Bobby Hicks Hwy (SR 75)	3.7	Interstate	Widening	Widen existing 4 lane interstate to 6 lanes
2	Johnson City	I-26	Bobby Hicks Hwy (SR 75)	Boones Creek Rd (SR 354)	3.7	Interstate	Widening	Widen existing 4 lane interstate to 6 lanes
3	Johnson City	I-26	Boones Creek Rd (SR 354)	N Roan St (US 11E)	3.4	Interstate	Widening	Widen existing 4 lane interstate to 6 lanes
4	Johnson City	I-26	N Roan St (US 11E)	US 321	3.7	Interstate	Widening	Widen existing 4 lane interstate to 6 lanes
5	Johnson City	Boones Creek Rd (SR 354)	I-26	Highland Church Rd	2.2	Minor Arterial	Widening	Widen existing 2 lane roadway to 4 lanes
6	Washington Co	Boones Creek Rd (SR 354)	Highland Church Rd	Jonesborough Bypass	2.9	Minor Arterial	Widening	Widen existing 2 lane roadway to 4 lanes
7	Jonesborough	Boones Creek Rd (SR 354)	Jonesborough Bypass	US 11E	1.2	Minor Arterial	Widening	Widen existing 2 lane roadway to 4 lanes
8	Jonesborough	Jonesborough Bypass	Boones Creek Rd (SR 354)	US 11E	2.7	Proposed Minor Arterial	New Road	Construct new 3 lane roadway
9	Johnson City	N. State of Franklin (SR 381)	I-26	Knob Creek Rd	1.0	Principal Arterial	Widening	Widen existing 4 lane roadway to 6 lanes
10	Johnson City	N. State of Franklin (SR 381)	Knob Creek Rd	Indian Ridge Rd	1.9	Principal Arterial	Widening	Widen existing 4 lane roadway to 6 lanes
11	Elizabethton	Elk Ave (SR 67)	Hudson Dr	Lynn Ave (SR 400)	1.4	Principal Arterial	Widening	Widen existing 4/5 lane roadway to 6 lanes
12	Johnson City	Bristol Hwy (SR 34)	N. State of Franklin (SR 381)	MTPO Planning Boundary	3.1	Principal Arterial	Widening	Widen existing 4/5 lane roadway to 6/7 lanes
13	Johnson City	Bristol Hwy (SR 34)	MTPO Planning Boundary	US 19E	4.5	Principal Arterial	Widening	Widen existing 4 lane roadway to 6/7 lanes
14	Johnson City	Roy Marlin Rd	Gray Stallion Rd	Bobby Hicks Hwy (SR 75)	0.2	Proposed Collector	Reconstruction	Reconstruct 2 lane roadway addressing geometric issues to align with Roy Marlin Rd Ext
15	Washington Co	Roy Marlin Rd Extension	Bobby Hicks Hwy (SR 75)	Free Hill Rd	1.0	Proposed Collector	New Road	Construct new 2 lane roadway
16	Washington Co	Free Hill Rd	Free Hill Rd	Kingsport Hwy (SR 36)	1.6	Proposed Collector	Reconstruction	Reconstruct 2 lane roadway addressing geometric issues
17	Johnson City	Knob Creek Rd*	Mizpah Hills Dr	Boones Creek Rd (SR 354)	2.0	Proposed Collector	Widening	Widen existing 2 lane roadway to 4 lanes
18	Elizabethton	W G St	W Elk Ave (SR 67)	Hudson Dr	2.0	Minor Arterial	Reconstruction	Reconstruct existing 2 lane roadway to 3 lanes (adding a center turn lane)
19	Johnson City	Watauga Rd (SR 400)	Broadway St	E Fairview Ave	1.1	Minor Arterial	Reconstruction	Reconstruct existing 2 lane roadway to 3 lanes (adding a center turn lane)
20	Johnson City	Watauga Rd (SR 400)	E Fairview Ave	Piney Flats Rd	2.8	Minor Arterial	Reconstruction	Reconstruct existing 2 lane roadway to 3 lanes (adding a center turn lane)
21	Washington Co	Bob Jobe Rd Extension	Eastern Star Rd (Bob Jobe Rd)	Ford Creek Rd	1.5	Proposed Collector	Reconstruction	Reconstruct 2 lane roadway addressing geometric issues to align with Bob Jobe Rd Ext
22	Washington Co	Bob Jobe Rd Extension	Ford Creek Rd	Center St	1.5	Proposed Collector	New Road	Construct new 2 lane roadway
23	Johnson City	Hopper Rd	W Market St (US 11E)	Indian Ridge Rd	0.7	Proposed Collector	Reconstruction	Reconstruct 2 lane roadway addressing geometric issues to align with Hopper Rd Ext
24	Johnson City	Hopper Rd Ext	Indian Ridge Rd	Claude Simmons Rd	1.0	Proposed Collector	New Road	Construct new 2 lane roadway
25	Carter Co	Okolona Rd (SR 359)	I-26	Existing Okolona Rd (SR 359)	0.7	Collector	Realignment	Realign existing roadway with interchange to create better access
26	Washington Co	SR 75	Boonesboro Rd	MTPO Planning Boundary (i.e. to US 11E)	12.8	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)
27	Washington Co	SR 81	Jonesborough Bypass	MTPO Planning Boundary (i.e. to I-81)	14.4	Minor Arterial	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)
28	Washington Co	Leesburg Rd	US 11E	SR 81	3.9	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)
29	Washington Co	SR 353	SR 81	SR 107	13.3	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)
30	Washington Co	SR 81	SR 353	MTPO Planning Boundary (i.e. to I-26)	13.8	Minor Arterial	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)
31	Carter Co	SR 361	SR 359	US 19E	8.9	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)
32	Carter Co	Okolona Rd (SR 359)	Milligan Hwy (SR 359)	S Roan St	1.6	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)
33	Washington Co	Highland Church	SR 75	Boones Creek Rd (SR 354)	5.3	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)

*Funded through the IMPROVE Act

Johnson City MTPO
2045 MTP Candidate Project List

2045 MTP #	Jurisdiction	Roadway	From	To	Length (Miles)	Federal Functional Classification	Type of Improvement	Project Description	Estimated Cost (2017 $s)
1	Johnson City	I-26	I-81	Bobby Hicks Hwy (SR 75)	3.7	Interstate	Widening	Widen existing 4 lane interstate to 6 lanes	$35,500,000
2	Johnson City	I-26	Bobby Hicks Hwy (SR 75)	Boones Creek Rd (SR 354)	3.7	Interstate	Widening	Widen existing 4 lane interstate to 6 lanes	$36,500,000
3	Johnson City	I-26	Boones Creek Rd (SR 354)	N Roan St (US11E)	3.4	Interstate	Widening	Widen existing 4 lane interstate to 6 lanes	$37,500,000
4	Johnson City	I-26	N Roan St (US11E)	US 321	3.7	Interstate	Widening	Widen existing 4 lane interstate to 6 lanes	$49,600,000
5	Johnson City	Boones Creek Rd (SR 354)	I-26	Highland Church Rd	2.2	Minor Arterial	Widening	Widen existing 2 lane roadway to 4 lanes	$15,400,000
6	Washington Co	Boones Creek Rd (SR 354)	Highland Church Rd	Jonesborough Bypass	2.9	Minor Arterial	Widening	Widen existing 2 lane roadway to 4 lanes	$18,300,000
7	Jonesborough	Boones Creek Rd (SR 354)	Jonesborough Bypass	US 11E	1.2	Minor Arterial	Widening	Widen existing 2 lane roadway to 4 lanes	$9,400,000
8	Jonesborough	Jonesborough Bypass	Boones Creek Rd (SR 354)	US 11E	2.7	Proposed Minor Arterial	New Road	Construct new 3 lane roadway	$14,600,000
9	Johnson City	N. State of Franklin (SR 381)	I-26	Knob Creek Rd	1.0	Principal Arterial	Widening	Widen existing 4 lane roadway to 6 lanes	$14,400,000
10	Johnson City	N. State of Franklin (SR 381)	Knob Creek Rd	Indian Ridge Rd	1.9	Principal Arterial	Widening	Widen existing 4 lane roadway to 6 lanes	$18,300,000
11	Elizabethton	Elk Ave (SR 67)	Hudson Dr	Lynn Ave (SR 400)	1.4	Principal Arterial	Widening	Widen existing 4/5 lane roadway to 6 lanes	$15,800,000
12	Johnson City	Bristol Hwy (SR 34)	N. State of Franklin (SR 381)	Washington/Sullivan Co. Line	3.1	Principal Arterial	Widening	Widen existing 4/5 lane roadway to 6/7 lanes	$26,900,000
13	Johnson City	Bristol Hwy (SR 34)	Washington/Sullivan Co. Line	US 19E	4.5	Principal Arterial	Widening	Widen existing 4 lane roadway to 6/7 lanes	$22,400,000
14	Johnson City	Roy Martin Rd	Gray Station Rd	Bobby Hicks Hwy (SR 75)	0.2	Proposed Collector	Reconstruction	Reconstruct 2 lane roadway addressing geometric issues to align with Roy Martin Rd Ext	$1,600,000
15	Washington Co	Roy Martin Rd Extension	Bobby Hicks Hwy (SR 75)	Free Hill Rd	1.0	Proposed Collector	New Road	Construct new 2 lane roadway	$5,300,000
16	Washington Co	Free Hill Rd	Free Hill Rd	Kingsport Hwy (SR 36)	1.6	Proposed Collector	Reconstruction	Reconstruct 2 lane roadway addressing geometric issues	$7,300,000
17	Johnson City	Knob Creek Rd*	Mizpath Hills Dr	Boones Creek Rd (SR 354)	2.0	Proposed Collector	Widening	Widen existing 2 lane roadway to 4 lanes	$20,200,000
18	Elizabethton	W G St	W Elk Ave (SR 67)	Hudson Dr	2.0	Minor Arterial	Reconstruction	Reconstruct existing 2 lane roadway to 3 lanes (adding a center turn lane)	$16,000,000
19	Johnson City	Watauga Rd (SR 400)	Broadway St	E Fairview Ave	1.1	Minor Arterial	Reconstruction	Reconstruct existing 2 lane roadway to 3 lanes (adding a center turn lane)	$9,000,000
20	Johnson City	Watauga Rd (SR 400)	E Fairview Ave	Piney Flats Rd	2.8	Minor Arterial	Reconstruction	Reconstruct existing 2 lane roadway to 3 lanes (adding a center turn lane)	$21,200,000
21	Washington Co	Bob Jobe Rd Extension	Eastern Star Rd (Bob Jobe Rd)	Ford Creek Rd	1.5	Proposed Collector	Reconstruction	Reconstruct 2 lane roadway addressing geometric issues to align with Bob Jobe Rd Ext	$8,400,000
22	Washington Co	Bob Jobe Rd Extension	Ford Creek Rd	Center St	1.5	Proposed Collector	New Road	Construct new 2 lane roadway	$5,600,000
23	Johnson City	Hopper Rd	W Market St (US 11E)	Indian Ridge Rd	0.7	Proposed Collector	Reconstruction	Reconstruct 2 lane roadway addressing geometric issues to align with Hopper Rd Ext	$4,900,000
24	Johnson City	Hopper Rd Ext	Indian Ridge Rd	Claude Simmons Rd	1.0	Proposed Collector	New Road	Construct new 2 lane roadway	$5,800,000
25	Carter Co	Okolona Rd (SR 359)	I-26	Existing Okolona Rd (SR 359)	0.7	Collector	Realignment	Realign existing roadway with interchange to create better access	$3,900,000
26	Washington Co	SR 75	Boonesboro Rd	MTPO Planning Boundary (i.e. to US 11E)	12.8	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	$7,700,000
27	Washington Co	SR 81	Jonesborough Bypass	MTPO Planning Boundary (i.e. to I-81)	14.4	Minor Arterial	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	$8,700,000
28	Washington Co	Leesburg Rd	US 11E	SR 81	3.9	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	$2,300,000
29	Washington Co	SR 353	SR 81	SR 107	13.3	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	$8,000,000
30	Washington Co	SR 81	SR 353	MTPO Planning Boundary (i.e. to I-26)	13.8	Minor Arterial	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	$8,300,000
31	Carter Co	SR 361	SR 359	US 19E	8.9	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	$5,300,000
32	Carter Co	Okolona Rd (SR 359)	Milligan Hwy (SR 359)	S Roan St	1.6	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	$1,000,000
33	Washington Co	Highland Church	SR 75	Boones Creek Rd (SR 354)	5.3	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	$3,200,000

*Funded through the IMPROVE Act

Projects Completed Since 2013 & Committed Improvements
(E+C Network)

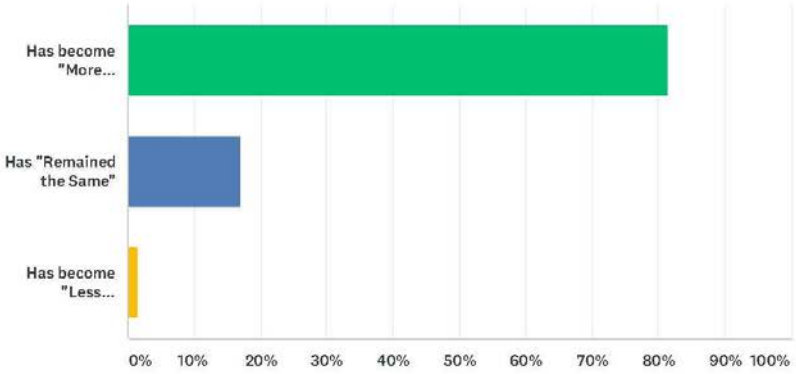
Project/Route	From/To	Type of Improvement	Improvement Description	Funding Status	Project Status
Projects Completed Since Last Plan (2013)					
Kingsport Hwy (SR 36)	SR 354 (Boone Avenue) to SR 75	Widening	Widen from 2 lanes to 5 lanes	Complete	Complete
Gap Creek Road (SR 362)	SR 67 to SR 361	Reconstruction	Reconstruct & Widen - 2 and 3 lanes	Complete	Complete
SR 75	SR 36 to SR 357	Widening	Widen from 2 lanes to 5 lanes	Complete	Complete
Traffic Signal Upgrades in Johnson City	Intersection/Signalization improvements at 10 locations in Johnson City	Intersection Improvement	Install traffic signals	Complete	Complete
Johnson City ITS Project (formerly IVHS)	Select State Routes in Johnson City	ITS	Install ITS (sensors, TOC, etc.) for Johnson City Traffic Division	Complete	Complete
I-26 Exit 13 (SR 75)	Exit 13 on I-26 (SR 75/ Suncrest Drive/ Bobby Hicks Highway @ I-26)	Interchange Improvement	Interchange modification	Complete	Complete
SR 91 and SR 67 Signals	Judge Ben Allen Road @ SR 91; SR 67 @ Williams Avenue in Elizabethton	Intersection Improvement	Install new traffic signals at intersections in Elizabethton	Complete	Complete
VA Hospital Connector	West Market Street to VA Hospital	New Roadway	Construct new 2-lane road	Complete	Complete
SR 81 & SR 353 (Jonesborough Five Points Intersection)	Intersection of SR 81 with SR 353 with Depot Street in Jonesborough	Intersection Improvement	Construct a roundabout	Complete	Complete
Committed Projects					
Traffic Circle for Mountainview Road	Intersection of Mountainview Road and Browns Mill Road	Intersection Improvement	Construct a roundabout	Funded thru CONST	Under CONST
SR 381	Intersection with Indian Ridge Road and Skyline Drive	Intersection Improvement	Add turn lanes, bridge rehabilitation	Funded thru CONST	Under CONST
I-26 Exit 24 (SR 67)*	Exit 24 on I-26 (SR 67/ University Parkway @ I-26)	Interchange Improvement	Ramp Modification	Funded thru CONST	Under CONST
Knob Creek Road Extension	West of Mizpah Hills Drive to Marketplace Boulevard	Reconstruction	Construct a new 5 lane (overpass crossing CSX RR)	Funded thru ROW in 2016	Under Development
SR 91 Extension (formerly Elizabethton Connector)*	US 19E to US 321	Reconstruction	Add center turn lane along the 4-lane undivided portion of West Elk Avenue from Holly Lane to North Roan Street. Sidewalk improvements and repaving of SR 91 from West G Street to SR 37 (US 19E).	Funded for ROW in 2018	Under Development
I-26 Exit 17 (SR 354)*	Exit 17 on I-26 (SR 354/ Boones Creek Road @ I-26)	Interchange Improvement	Interchange modification	Funded thru ROW. ROW to start in spring 2017	Under Development
Greenline Road	Intersection of Peoples Street and Greenline Road	Intersection Improvement	Intersection Improvement	Funded for PE in 2020	Not Started
Adaptive Signal Control - Phase 1	SR 381 (North State of Franklin Road) from Knob Creek Road to Browns Mill Road	ITS	Add adaptive signal control on North State of Franklin Road in the vicinity of I-26 to improve safety and reduce congestion.	Funded for PE, CONST in 2019	Not Started
Adaptive Signal Control - Phase 2	Systemwide deployment throughout Johnson City	ITS	Deployment of real-time adaptive signal control technologies	Funded for PE, CONST in 2019	Not Started
Elk River Bridge Repair	Elk Avenue Bridge over Doe River	Bridge Rehabilitation	Repair and rehab the bridge due to deterioration	Funded for PE 2017, CONST in 2018	Under Development
Signalization Improvements for Elizabethton at Two Intersections	SR067 (Elk Ave) and Milligan Hwy/ SR067 (Elk Ave) and Mill St	Intersection Improvement	Upgrade and install traffic signals	Funding for PE, CONST in 2017	Under Development
SR 34 at Industrial Park Road Traffic Signal Upgrade	Intersection of SR 34 (US 11E/19W) at Industrial Park Road	Intersection Improvement	Upgrade traffic signals	Funded thru PE, CONST in 2017	Under Development
Traffic Signal for State of Franklin Road and Harris Dr	Intersection of SR 381 (State of Franklin Road) and Harris Dr	Intersection Improvement	Install traffic signals	Funded for PE, CONST in 2017	Under Development
Traffic Signal Upgrades at various locations in Elizabethton	Intersection/Signalization improvements at various intersections in Elizabethton	Intersection Improvement	Upgrade and install traffic signals at various intersections to improve safety and congestion	Funded for PE, CONST in 2018	Not Started
SR 34 at SR 354 in Jonesborough	Intersection of SR 34 (US 11E) and SR 354 (Boones Creek Road)	Intersection Improvement	Intersection Improvement	Funded thru CONST in 2017	Under CONST
SR 34 Improvements	SR 34 (US 11E) from Jonesborough City Limits to Claude Simmons Road	Reconstruction	Install turn lanes	Funded thru CONST in 2017	Under CONST
Traffic Signal for SR 36 at Mountainview Road	SR 36 (North Roan Street) at Mountainview Road	Intersection Improvement	Install traffic signals	Funded thru CONST in 2017	Not Started
SR 81 at Persimmon Ridge Road Improvements	SR 81 (West Main Street) at Persimmon Ridge Road	Intersection Improvement	Intersection Improvement	Funded thru ROW	Under Development
SR 354 and Bugaboo Springs Road Improvements	SR 354 (Boones Creek Road) at Bugaboo Springs Road	Intersection Improvement	Intersection Improvement	Funded thru ROW	Under Development

*Funded through the IMPROVE Act

Online Survey Results

Q1 Travel on roadways in the region (the cities and towns of Bluff City, Johnson City, Elizabethton, Jonesborough, Unicoi, and Watauga and portions of Washington, Carter, Unicoi and Sullivan counties) over the last five years:

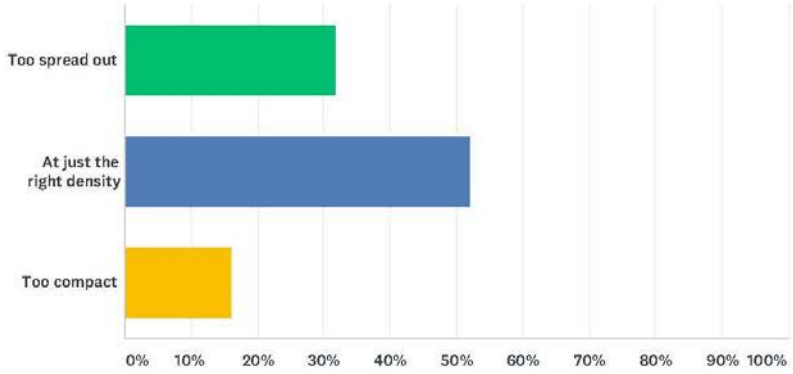
Answered: 383 Skipped: 2



ANSWER CHOICES	RESPONSES	
Has become "More Congested"	81.46%	312
Has "Remained the Same"	16.97%	65
Has become "Less Congested"	1.57%	6
TOTAL		383

Q2 Development in the Johnson City region in the last 10 years has been:

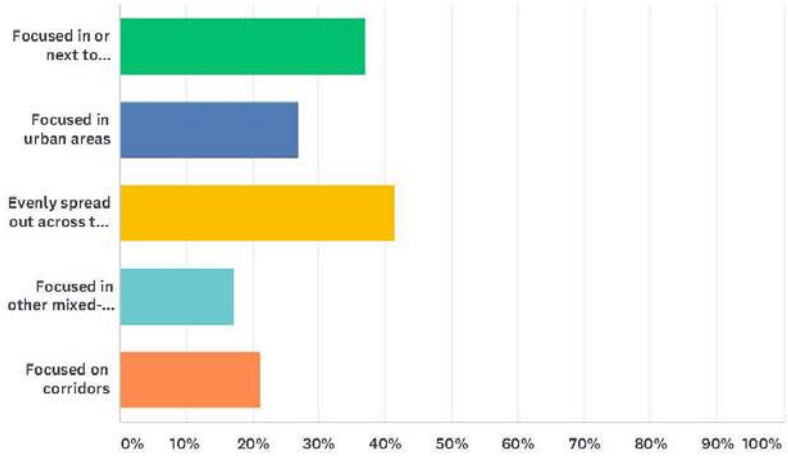
Answered: 380 Skipped: 5



ANSWER CHOICES	RESPONSES	
Too spread out	31.84%	121
At just the right density	52.11%	198
Too compact	16.05%	61
TOTAL		380

Q3 In the future, development in the Johnson City region should be: (Select all that apply)

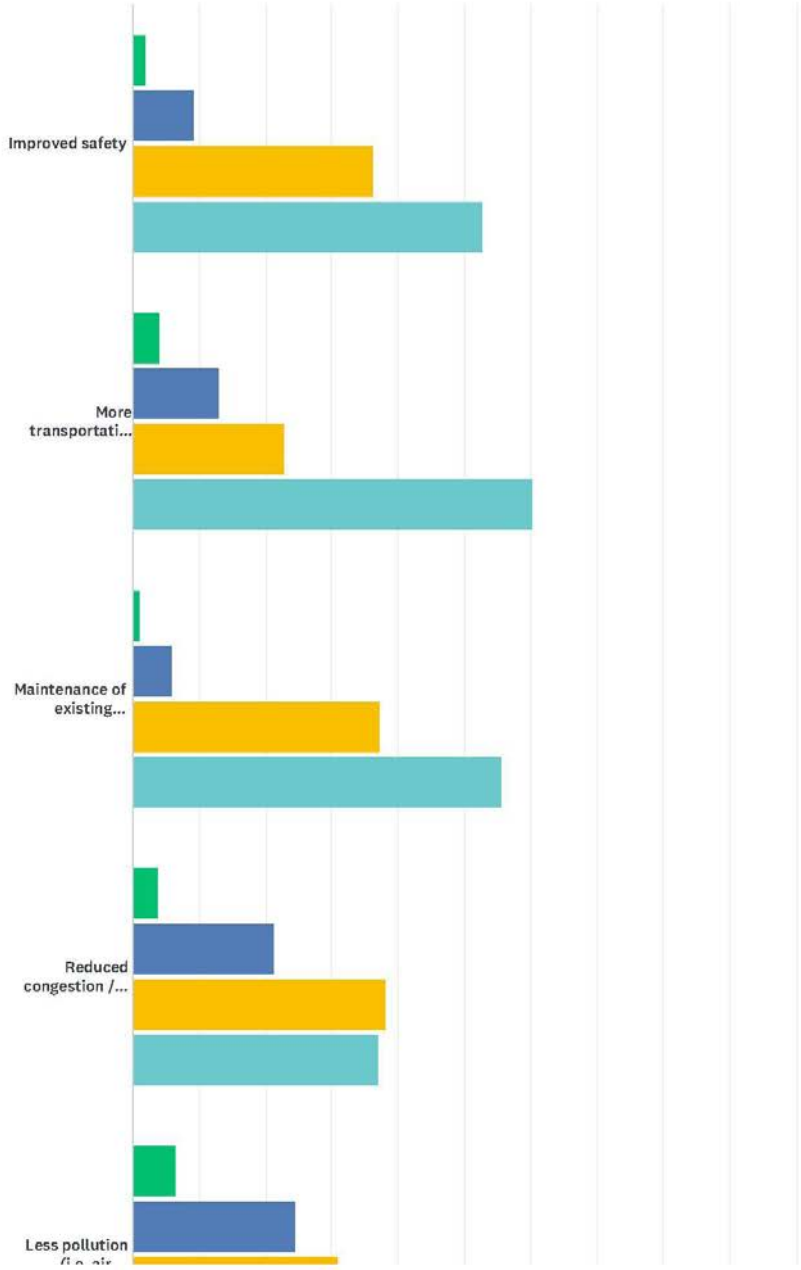
Answered: 379 Skipped: 6



ANSWER CHOICES	RESPONSES	
Focused in or next to existing development	36.94%	140
Focused in urban areas	26.91%	102
Evenly spread out across the region	41.42%	157
Focused in other mixed-use centers	17.15%	65
Focused on corridors	21.11%	80
Total Respondents: 379		

Q4 How important are the following priorities for the overall transportation system in the Johnson City region?

Answered: 372 Skipped: 13



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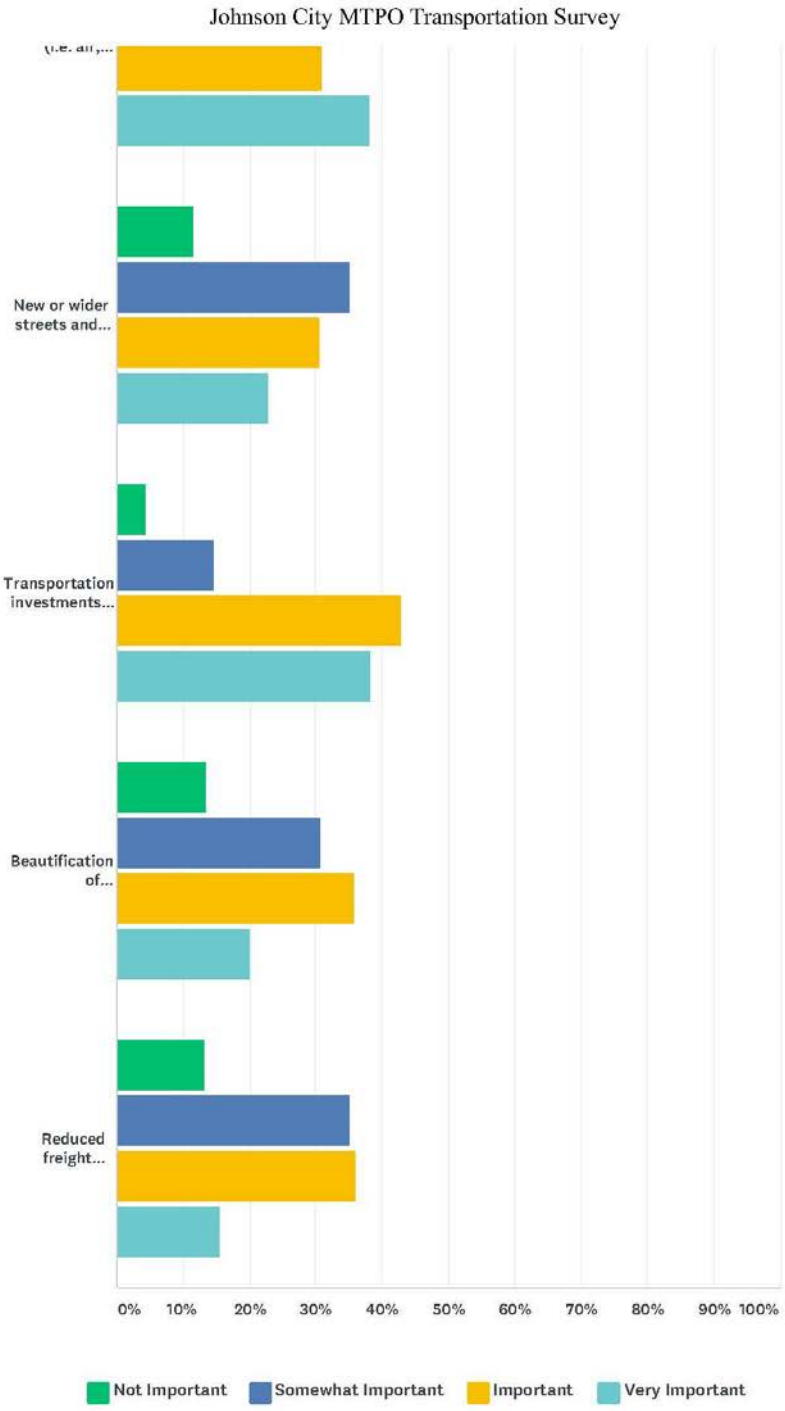

	NOT IMPORTANT	SOMEWHAT IMPORTANT	IMPORTANT	VERY IMPORTANT	TOTAL

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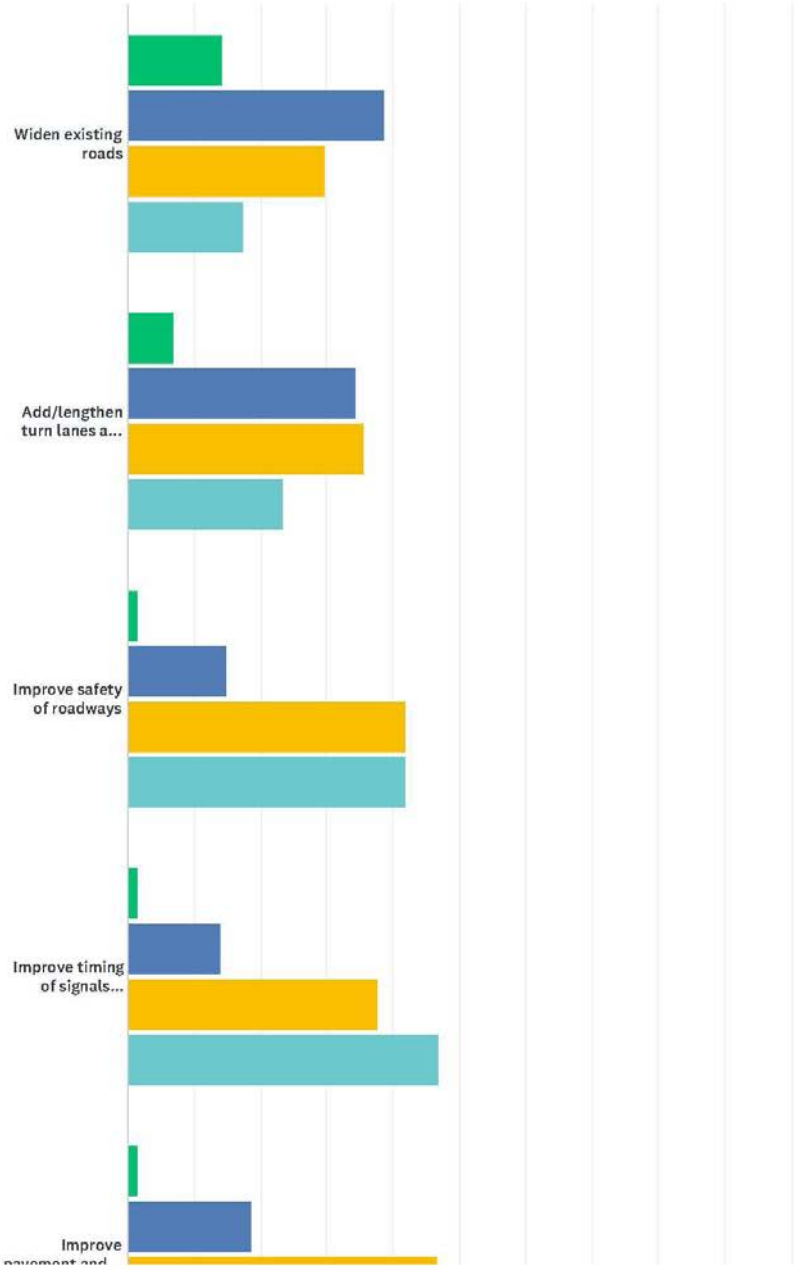
Improved safety	1.89% 7	9.19% 34	36.22% 134	52.70% 195	370
More transportation choices (i.e. bus service, bicycle paths, sidewalks)	4.05% 15	12.97% 48	22.70% 84	60.27% 223	370
Maintenance of existing roadways	1.08% 4	5.95% 22	37.30% 138	55.68% 206	370
Reduced congestion / less delay	3.77% 14	21.29% 79	38.01% 141	36.93% 137	371
Less pollution (i.e. air, noise)	6.52% 24	24.46% 90	30.98% 114	38.04% 140	368
New or wider streets and highways	11.44% 42	35.15% 129	30.52% 112	22.89% 84	367
Transportation investments that support/target economic growth	4.34% 16	14.63% 54	42.82% 158	38.21% 141	369
Beautification of transportation facilities	13.32% 49	30.71% 113	35.87% 132	20.11% 74	368
Reduced freight transportation conflicts (between personal travel and commercial trucks or railroads)	13.28% 49	35.23% 130	36.04% 133	15.45% 57	369

Q5 Road ImprovementsHow important are the following in addressing the Region's transportation needs?

Answered: 342 Skipped: 43



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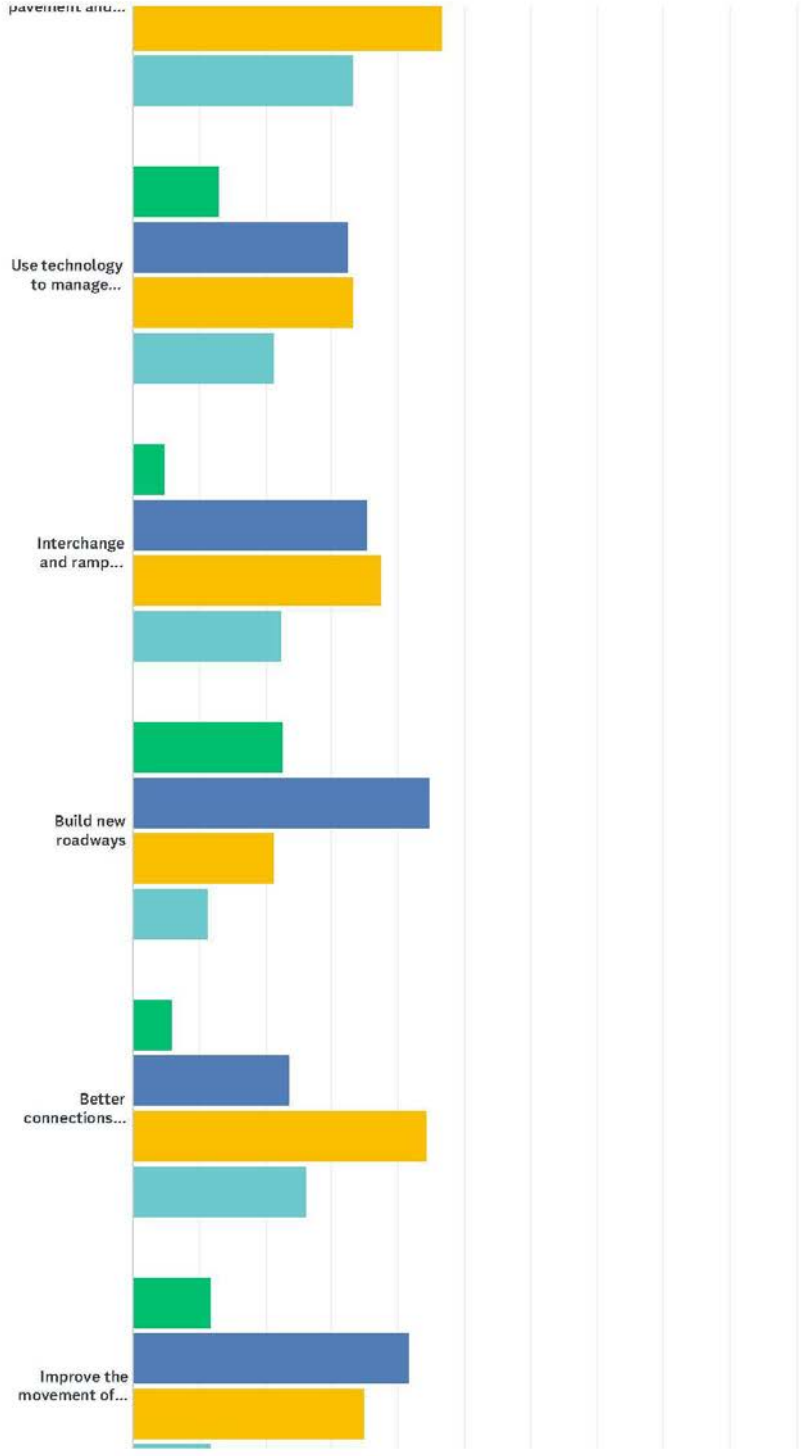
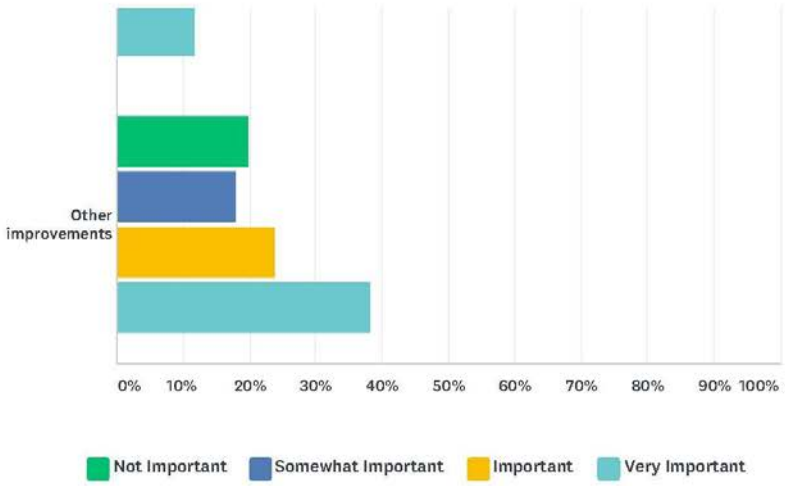
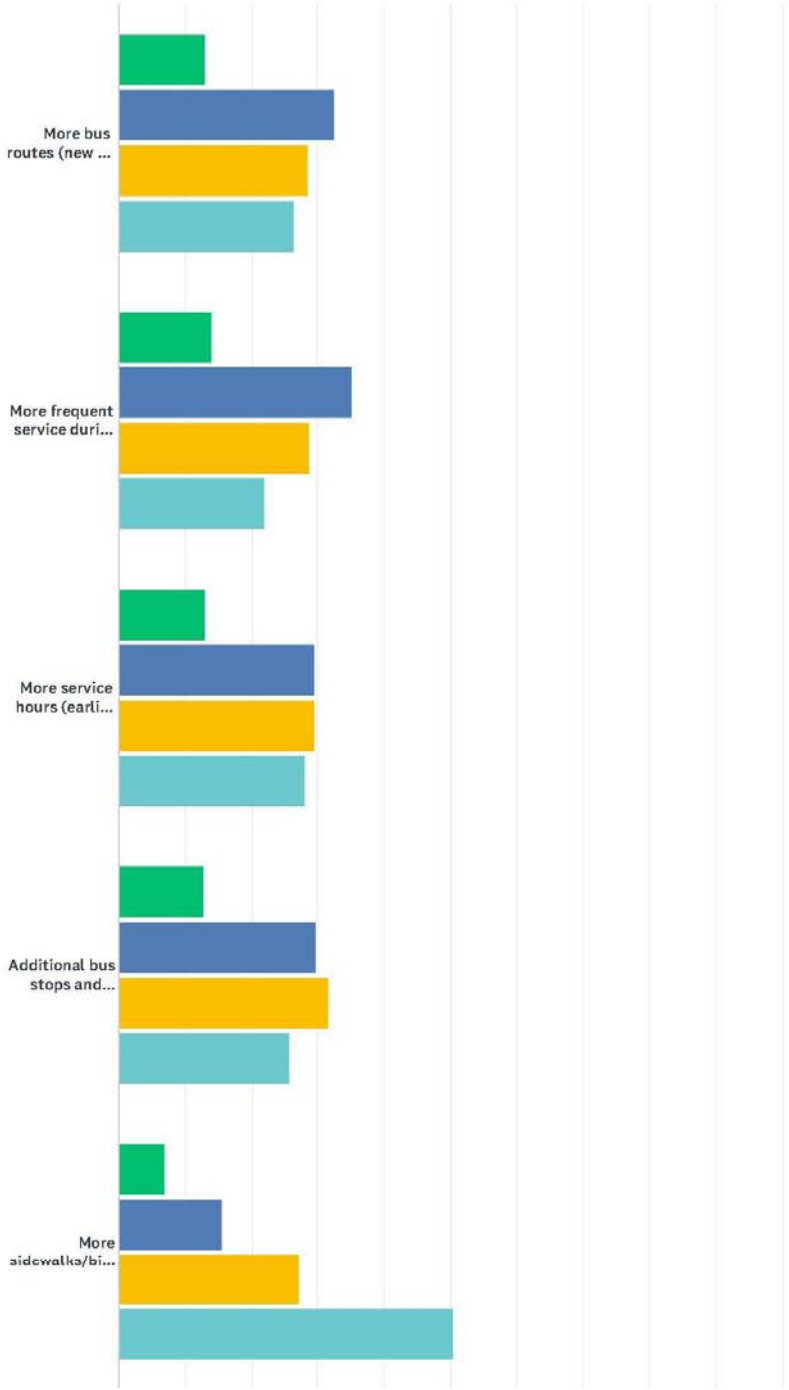

pavement and...
Use technology to manage...
Interchange and ramp...
Build new roadways
Better connections...
Improve the movement of...

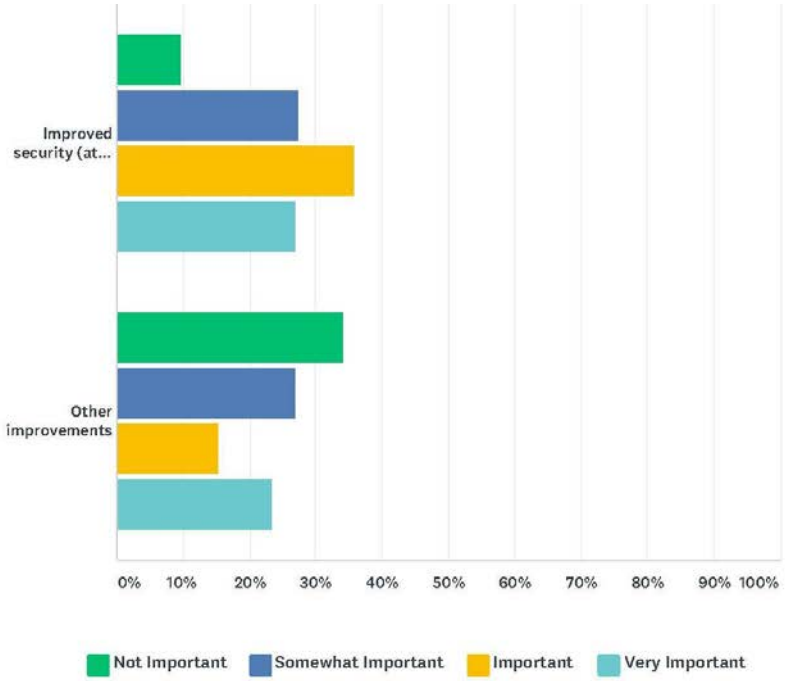


	NOT IMPORTANT	SOMEWHAT IMPORTANT	IMPORTANT	VERY IMPORTANT	TOTAL
Widen existing roads	14.16% 48	38.64% 131	29.79% 101	17.40% 59	339
Add/lengthen turn lanes at road intersections	6.80% 23	34.32% 116	35.50% 120	23.37% 79	338
Improve safety of roadways	1.48% 5	14.84% 50	41.84% 141	41.84% 141	337
Improve timing of signals (traffic lights)	1.47% 5	14.12% 48	37.65% 128	46.76% 159	340
Improve pavement and bridges	1.48% 5	18.69% 63	46.59% 157	33.23% 112	337
Use technology to manage roadways (video, sensors, etc.)	12.98% 44	32.45% 110	33.33% 113	21.24% 72	339
Interchange and ramp Improvements	4.76% 16	35.42% 119	37.50% 126	22.32% 75	336
Build new roadways	22.55% 76	44.81% 151	21.36% 72	11.28% 38	337
Better connections between travel options	5.90% 20	23.60% 80	44.25% 150	26.25% 89	339
Improve the movement of goods & freight (Better freight shipping options)	11.68% 39	41.62% 139	35.03% 117	11.68% 39	334
Other improvements	19.82% 44	18.02% 40	23.87% 53	38.29% 85	222

Q6 Transit ImprovementsHow important are the following in addressing the Region's transportation needs?

Answered: 332 Skipped: 53

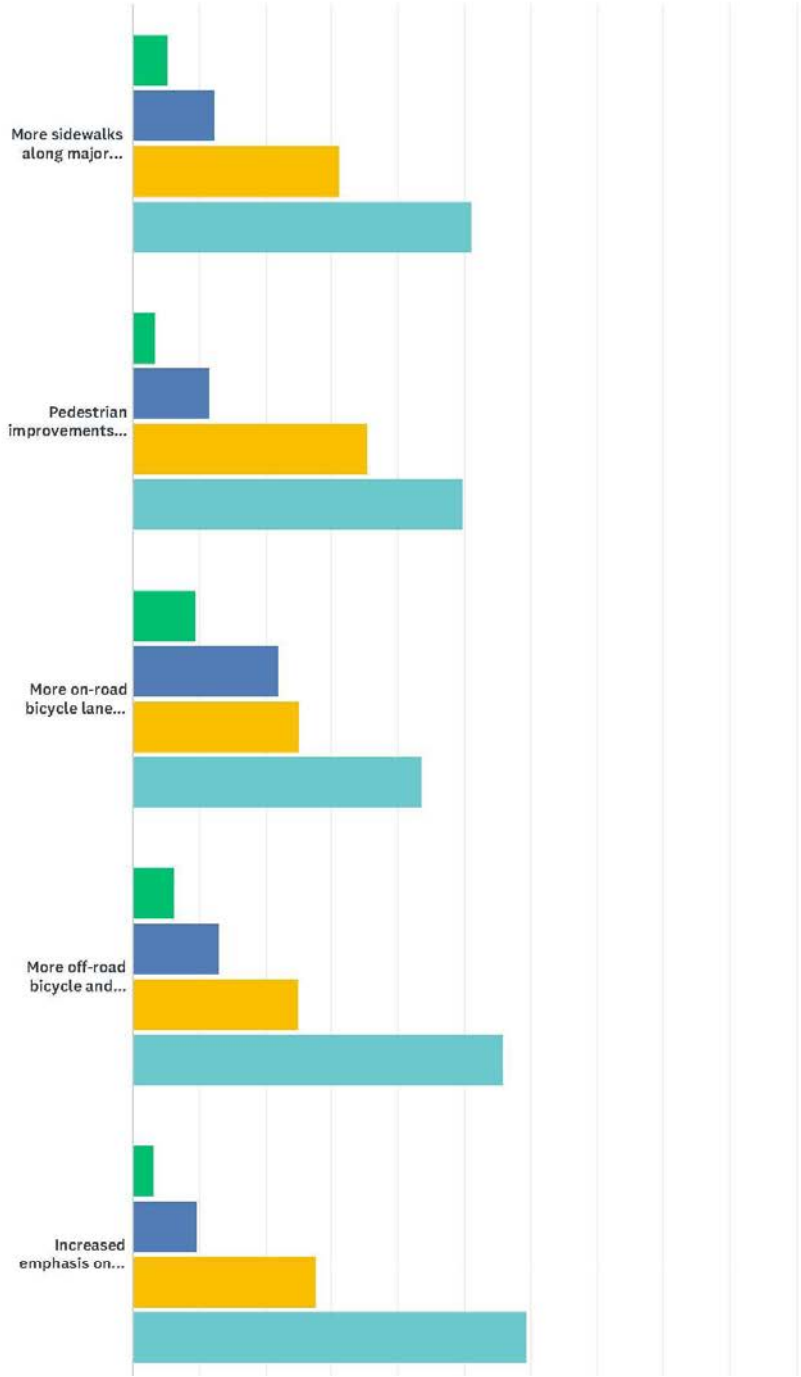


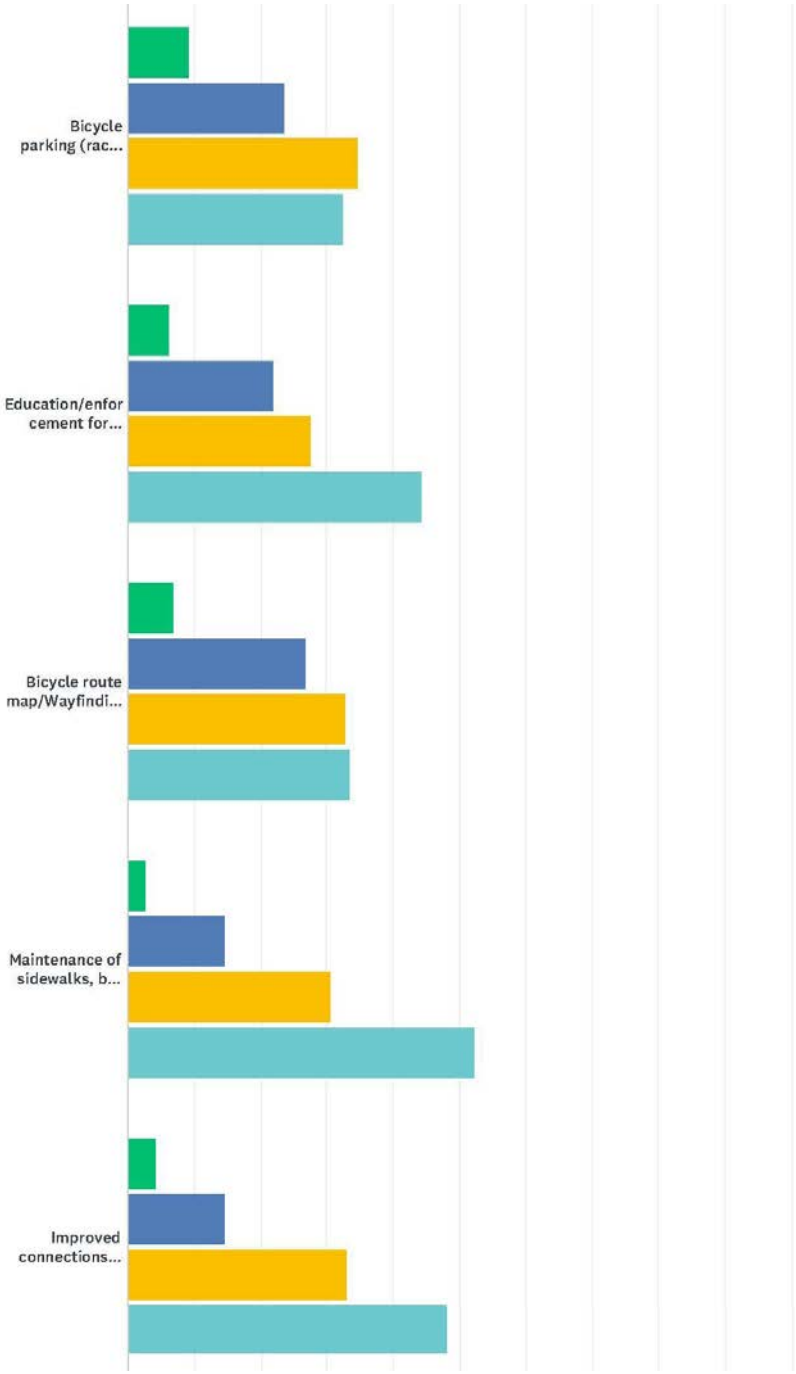


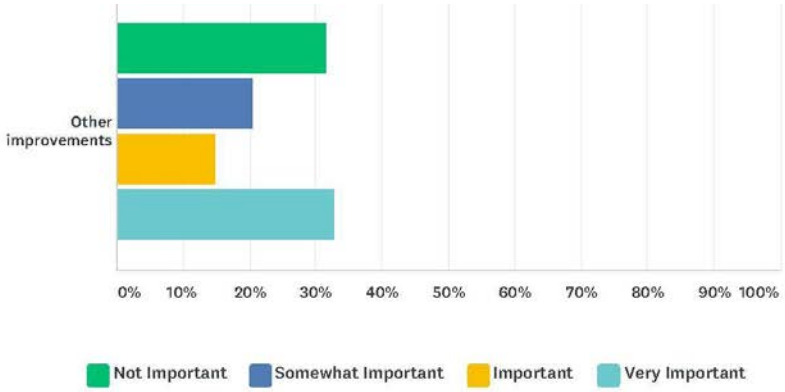
	NOT IMPORTANT	SOMEWHAT IMPORTANT	IMPORTANT	VERY IMPORTANT	TOTAL
More bus routes (new and expanded)	12.99% 43	32.33% 107	28.40% 94	26.28% 87	331
More frequent service during existing hours	14.07% 46	35.17% 115	28.75% 94	22.02% 72	327
More service hours (earlier AM hrs, later PM hrs, Sunday service)	12.95% 43	29.52% 98	29.52% 98	28.01% 93	332
Additional bus stops and shelters	12.77% 42	29.79% 98	31.61% 104	25.84% 85	329
More sidewalks/bike trails connecting to bus stops	6.95% 23	15.41% 51	27.19% 90	50.45% 167	331
Improved security (at bus stops/bus terminal/on bus)	9.73% 32	27.36% 90	35.87% 118	27.05% 89	329
Other improvements	34.12% 58	27.06% 46	15.29% 26	23.53% 40	170

Q7 Bicycle and Pedestrian ImprovementsHow important are the following in addressing the Region's transportation needs?

Answered: 341 Skipped: 44



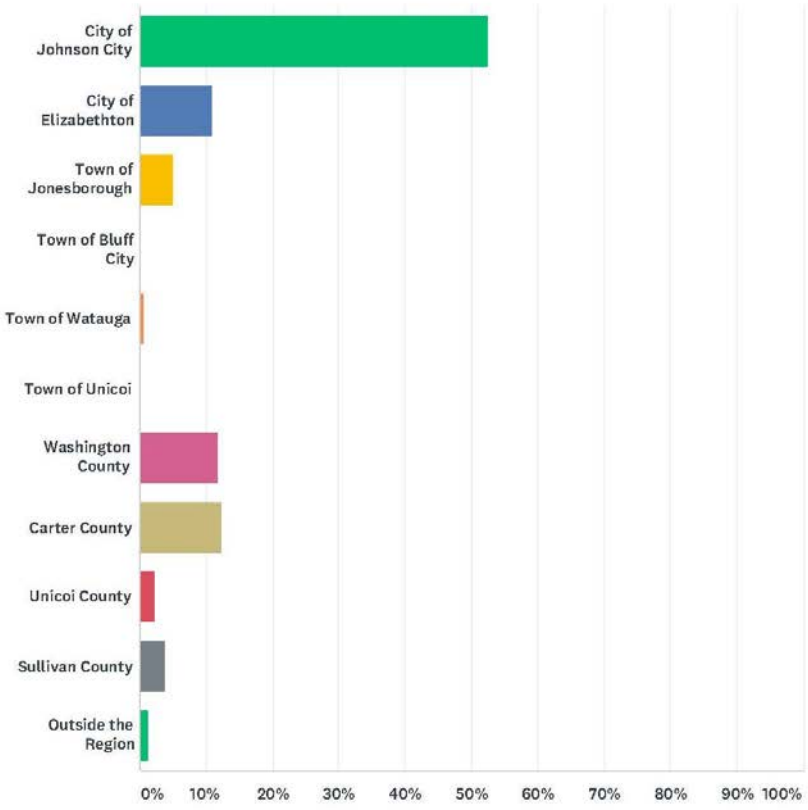

Bicycle parking (rac...
Education/enforcement for...
Bicycle route map/Wayfindi...
Maintenance of sidewalks, b...
Improved connections...



	NOT IMPORTANT	SOMEWHAT IMPORTANT	IMPORTANT	VERY IMPORTANT	TOTAL
More sidewalks along major roads	5.31% 18	12.39% 42	31.27% 106	51.03% 173	339
Pedestrian improvements at road intersections (pedestrian signals/crosswalks)	3.24% 11	11.50% 39	35.40% 120	49.85% 169	339
More on-road bicycle lanes and bike routes	9.47% 32	21.89% 74	25.15% 85	43.49% 147	338
More off-road bicycle and pedestrian trails (greenways and trails)	6.21% 21	13.02% 44	24.85% 84	55.92% 189	338
Increased emphasis on safe routes to school (for walking and biking)	3.24% 11	9.71% 33	27.65% 94	59.41% 202	340
Bicycle parking (racks, lockers, etc.)	9.20% 31	23.74% 80	34.72% 117	32.34% 109	337
Education/enforcement for motorists, pedestrians, & bicyclists	6.21% 21	21.89% 74	27.51% 93	44.38% 150	338
Bicycle route map/Wayfinding signs	6.87% 23	26.87% 90	32.84% 110	33.43% 112	335
Maintenance of sidewalks, bike lanes, bike routes/greenways	2.67% 9	14.54% 49	30.56% 103	52.23% 176	337
Improved connections between sidewalks, bikeways and transit	4.17% 14	14.58% 49	33.04% 111	48.21% 162	336
Other improvements	31.68% 51	20.50% 33	14.91% 24	32.92% 53	161

Q8 Where do you live? (If you are a college student, please indicate based on your housing location in the region.)

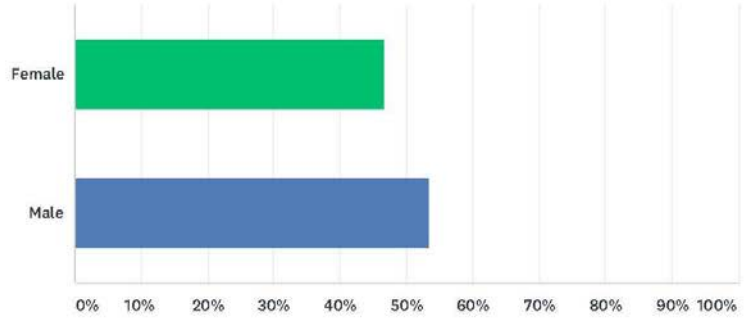
Answered: 343 Skipped: 42



ANSWER CHOICES	RESPONSES	
City of Johnson City	52.48%	180
City of Elizabethton	10.79%	37
Town of Jonesborough	4.96%	17
Town of Bluff City	0.00%	0
Town of Watauga	0.58%	2
Town of Unicoi	0.00%	0
Washington County	11.66%	40
Carter County	12.24%	42
Unicoi County	2.33%	8
Sullivan County	3.79%	13
Outside the Region	1.17%	4
TOTAL		343

Q9 What is your gender?

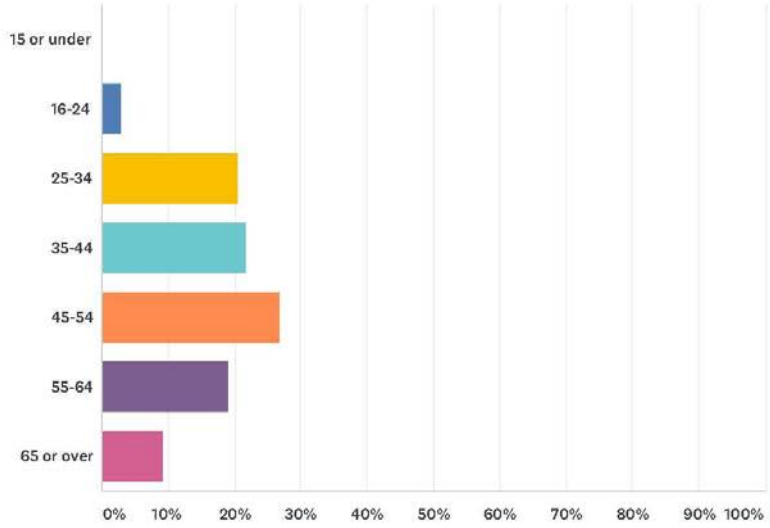
Answered: 332 Skipped: 53



ANSWER CHOICES	RESPONSES	
Female	46.69%	155
Male	53.31%	177
TOTAL		332

Q10 What is your age?

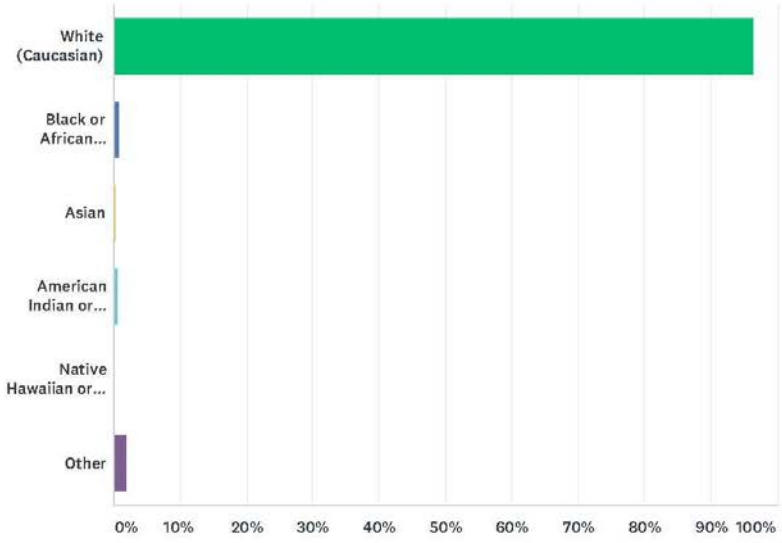
Answered: 337 Skipped: 48



ANSWER CHOICES	RESPONSES	
15 or under	0.00%	0
16-24	2.97%	10
25-34	20.47%	69
35-44	21.66%	73
45-54	26.71%	90
55-64	18.99%	64
65 or over	9.20%	31
TOTAL		337

Q11 Do you consider yourself to be:

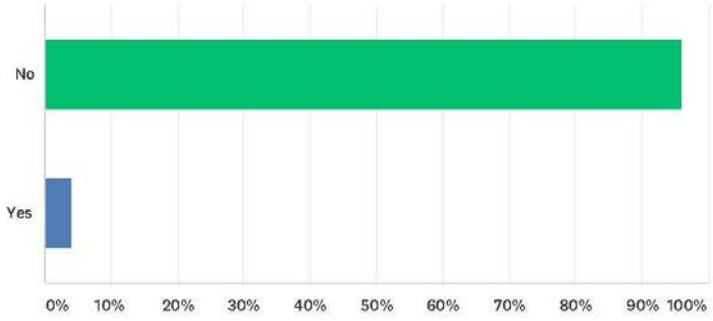
Answered: 333 Skipped: 52



ANSWER CHOICES	RESPONSES	
White (Caucasian)	96.40%	321
Black or African American	0.90%	3
Asian	0.30%	1
American Indian or Alaska Native	0.60%	2
Native Hawaiian or Other Pacific Islander	0.00%	0
Other	1.80%	6
TOTAL		333

Q12 Are you of Hispanic, Latino, or Spanish origin?

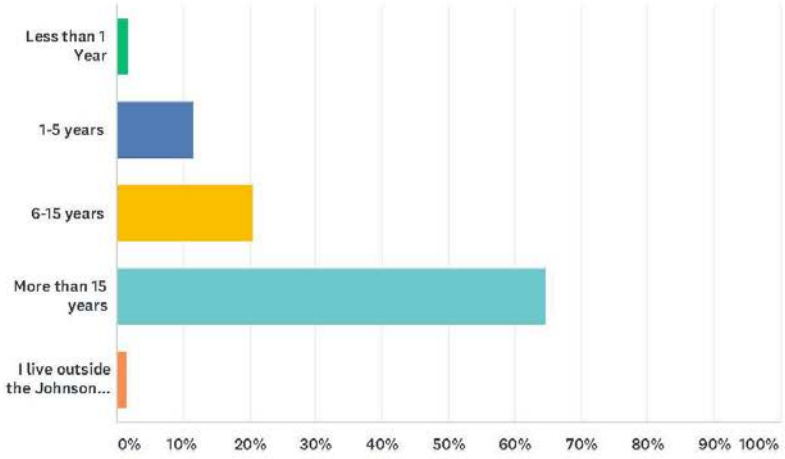
Answered: 330 Skipped: 55



ANSWER CHOICES	RESPONSES	
No	96.06%	317
Yes	3.94%	13
TOTAL		330

Q13 How long have you lived in the Johnson City region (the cities and towns of Bluff City, Johnson City, Elizabethton, Jonesborough, Unicoi, and Watauga and portions of Washington, Carter, Unicoi and Sullivan counties)?

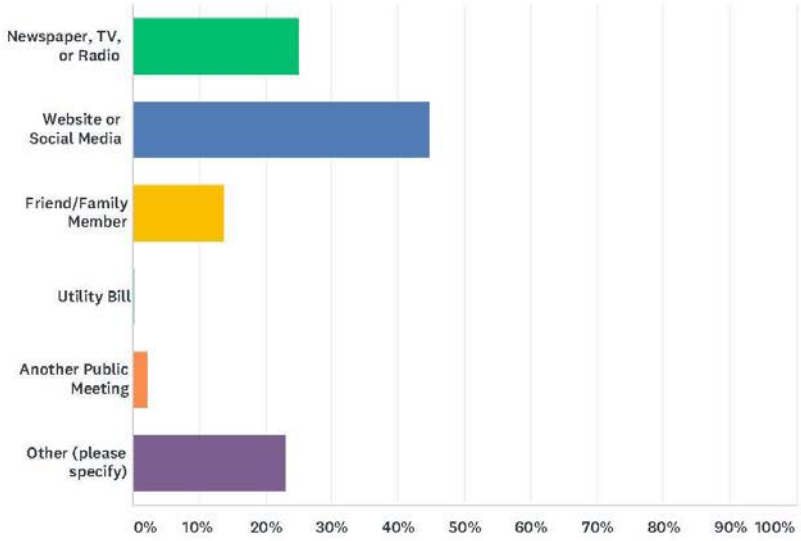
Answered: 340 Skipped: 45



ANSWER CHOICES	RESPONSES	
Less than 1 Year	1.76%	6
1-5 years	11.47%	39
6-15 years	20.59%	70
More than 15 years	64.71%	220
I live outside the Johnson City region	1.47%	5
TOTAL		340

Q14 How did you hear about this study and survey? (Select all that apply)

Answered: 342 Skipped: 43



ANSWER CHOICES	RESPONSES	
Newspaper, TV, or Radio	25.15%	86
Website or Social Media	44.74%	153
Friend/Family Member	13.74%	47
Utility Bill	0.29%	1
Another Public Meeting	2.34%	8
Other (please specify)	23.10%	79
Total Respondents: 342		

Q15 If you would like to be notified about upcoming meetings and other MTPO activities, please provide your email address (optional). We would be glad to add you to our email list. You may unsubscribe at any time.

Answered: 91 Skipped: 294

ANSWER CHOICES	RESPONSES	
Name:	0.00%	0
Company:	0.00%	0
Address:	0.00%	0
Address 2:	0.00%	0
City/Town:	0.00%	0
State:	0.00%	0
ZIP:	0.00%	0
Country:	0.00%	0
Email Address:	100.00%	91
Phone Number:	0.00%	0

Appendix II – Financial Plan

Transportation Consultants
A DIVISION OF KCI TECHNOLOGIES INC.
1101 17th Avenue South • Nashville, TN 37212 • (615) 370-8410 • Fax (615) 370-8455

Memorandum (via Email)

To: Glenn Berry, Johnson City MTPO

From: Preston Elliott, RPM/KCI

Date: September 13, 2017 (Revised September 27, 2017)

Re: **Johnson City MTPO 2045 MTP - Financial Plan Revenue Assumptions**

The purpose of this memorandum is document the methodology and assumptions used in developing revenue projections as part of the Johnson City MTPO's Financial Plan for their 2045 Metropolitan Transportation Plan (MTP). Concluding your review of the revenue forecast methodology and assumptions we are requesting your concurrence with the revenue forecast assumptions of the Financial Plan for use in the Johnson City MTPO 2045 MTP.

Federal Regulations on Financial Plan of the MTPO's MTP

23 CFR Part 450 Subpart A - Transportation Planning and Programming Definitions and Subpart C - Metropolitan Transportation Planning and Programming speak to the level and intent of financial plan requirements as part of a MPO's MTP. The following highlight several key provisions of these requirements:

§ 450.104 Definitions.
Financially constrained or Fiscal constraint means that the metropolitan transportation plan, TIP, and STIP includes sufficient financial information for demonstrating that projects in the metropolitan transportation plan, TIP, and STIP can be implemented using committed, available, or reasonably available revenue sources, with reasonable assurance that the federally supported transportation system is being adequately operated and maintained.

§ 450.324 Development and content of the metropolitan transportation plan.
(11) A financial plan that demonstrates how the adopted transportation plan can be implemented.

(i) For purposes of transportation system operations and maintenance, the financial plan shall contain system-level estimates of costs and revenue sources that are reasonably expected to be available to adequately operate and maintain the Federal-aid highways (as defined by 23 U.S.C. 101(a)(5)) and public transportation (as defined by title 49 U.S.C. Chapter 53).

(ii) For the purpose of developing the metropolitan transportation plan, the MPO, public transportation operator(s), and State shall cooperatively develop estimates of funds that will be available to support metropolitan transportation plan implementation, as required under § 450.314(a). All necessary financial resources from public and private sources that are reasonably expected to be made available to carry out the transportation plan shall be identified.

(iv) In developing the financial plan, the MPO shall take into account all projects and strategies proposed for funding under title 23 U.S.C., title 49 U.S.C. Chapter 53 or with other Federal funds; State assistance; local sources; and private participation. Revenue and cost estimates that support the metropolitan transportation plan must use an inflation rate(s) to reflect "year of expenditure dollars," based on reasonable financial principles and information, developed cooperatively by the MPO, State(s), and public transportation operator(s).

Source: Part III Department of Transportation, Federal Highway Administration 23 CFR Parts 450 and 500 and Federal Transit Administration 49 CFR Part 613, Statewide Transportation Planning; Metropolitan Transportation Planning; Final Rule, May 27, 2016.

Resources Reviewed

In developing revenue forecasts for the Financial Plan of the MTPO's 2045 MTP the following most readily available documents and resources were reviewed.

MTPO Resources

- JCMTPO Transportation Improvement Program for Fiscal Years 2008-2011
- JCMTPO Transportation Improvement Program for Fiscal Years 2011-2014
- JCMTPO Transportation Improvement Program for Fiscal Years 2014-2017
- JCMTPO Transportation Improvement Program for Fiscal Years 2017-2020

* Including Amendments & Adjustments of these Documents

City and County Resources

- City of Bluff City, TN - Annual Financial Reports for Fiscal Years 2010 thru 2015
- City of Elizabethton, TN - Annual Financial Reports for Fiscal Years 2010 thru 2015
- City of Johnson City, TN - Annual Financial Reports for Fiscal Years 2010 thru 2015
- City of Jonesborough, TN - Annual Financial Reports for Fiscal Years 2010 thru 2015
- City of Watauga, TN - Annual Financial Reports for Fiscal Years 2010 thru 2015
- Town of Unicoi, TN - Annual Financial Reports for Fiscal Years 2010 thru 2015
- Carter County, TN - Annual Financial Reports for Fiscal Years 2010 thru 2015
- Sullivan County, TN - Annual Financial Reports for Fiscal Years 2010 thru 2015
- Unicoi County, TN - Annual Financial Reports for Fiscal Years 2010 thru 2015
- Washington County, TN - Annual Financial Reports for Fiscal Years 2010 thru 2015
- First Tennessee HRA - Annual Financial Reports for Fiscal Years 2006-2015

State Resources

- TDOT Fiscal Years 2017-2020 Tennessee Transportation Improvement Program
- Tennessee Comptroller of the Treasury, Division of County Audit - Annual Financial Reports (website - www.comptroller.tn.gov/la/ReportsAudits.asp)
- Tennessee Comptroller of the Treasury, Transparency and Accountability for Governments (TAG) in Tennessee (website - www.comptroller.tn.gov/TAG/tag.aspx)
- Tennessee General Assembly Budget Information County by County Budget Reporting (website - www.capitol.tn.gov/joint/staff/budget-analysis/county-reports/)
- Tennessee Improving Manufacturing, Public Roads, and Opportunities for a Vibrant Economy (IMPROVE Act) (website - www.tn.gov/revenue/article/improve-act)

Summary financial data were developed from these resources creating historic and annual averages for various federal, state, and local funding sources/programs. The attached PDF file titled "JCMTPO 2045 MTP Historic Revenues" contains summary funding level tables for federal, state, and local funds within the MTPO area for both transportation capital and operating/maintenance activities.

Revenue Forecasts

Based on a review of the resources previously mentioned and summary financial tables contained in the PDF file "JCMTPO 2045 MTP Historic Revenues", annual revenue estimates were established. The attached PDF file titled "JCMTPO 2045 MTP Financial Plan" provides revenue projections for the Johnson City MTPO's 2045 MTP. Revenue projections are categorized by Capital funding for the MTPO, Operations and Maintenance funding for the MTPO by jurisdiction, Transit Capital funding for the MTPO, and Transit Operating funding for the MTPO.

To comply with the requirement of 23 CFR 450.324 (11), (iv) "year of expenditure dollars", US inflation rate data were evaluated. Inflation is an increase in the price you pay or a decline in the purchasing power of money. In other words, Price Inflation is when prices get higher or it takes more money to buy the same item. Inflation is measured by the Bureau of Labor Statistics in the United States using the Consumer Price Index. Long term US inflation trends (over a 25 to 30 year time period) track at about 3 percent per year (source: http://inflationdata.com). Based on the long term average 3 percent, revenues have been projected to increase at a 3 percent annual growth rate compounded annually over current funding levels. Consequently, project costs and program categories of the 2045 MTP will be escalated at the same rate to reflect a likely project cost at "year of expenditure".

Starting from the year 2020, revenue forecasts have been projected by horizon year (2025 and 2045) and reflect appropriate match requirements.

Requested Action

To fulfill federal planning requirements relative to the Financial Plan of the MTPO's metropolitan transportation plan, we are requesting your concurrence with the revenue forecast assumptions of the Financial Plan for use in the Johnson City MTPO 2045 Metropolitan Transportation Plan. Once we receive concurrence on the revenue assumptions we will move to the next stage of the Financial Plan which is the balancing of project costs, reflecting year of expenditure cost estimates, to available revenues.

Should you have any questions regarding this memorandum or the attached items, please let me know.

Attachments:

JCMTPO 2045 MTP Historic Revenues.PDF (electronic file)
JCMTPO 2045 MTP Financial Plan 092717.PDF (electronic file)

Johnson City MTPO

2045 Metropolitan Transportation Plan

Financial Plan – Revenue Forecasts

Johnson City MTPO
2045 Metropolitan Transportation Plan
Revenue Forecasts

Streets & Highways - Capital Funding

Revenue Source	Annual Average [1]				Revenue Projections		
	Federal Share	Non-Federal Share	Total	Inflation Factor [2]	2025 Horizon Year	2045 Horizon Year	Total 2020-2045
National Highway Performance Program (NHPP) Funds (NHS, IM, & portion BRR/BR Funds) - (80%/20%)	$1,300,000	$325,000	$1,625,000	1.03	$10,827,000	$53,702,000	$64,529,000
Surface Transportation Program (S-STBG) Funds (S-STBG & portion of BRR/BR Funds) State Selected Projects - (80%/20%)	$1,000,000	$250,000	$1,250,000	1.03	$8,328,000	$41,309,000	$49,637,000
Highway Safety Improvement Program (HSIP) Funds Safety Funding (90%/10%)	$1,800,000	$200,000	$2,000,000	1.03	$13,325,000	$66,094,000	$79,419,000
Surface Transportation Program (L-STBG) Funds MPO Selected Projects (80%/20%)	$2,900,000	$725,000	$3,625,000	1.03	$24,151,000	$119,796,000	$143,947,000
Transportation Alternatives (TA) Funds (EHN, RTP, SRTS Funds) (80%/20%)	$200,000	$50,000	$250,000	1.03	$1,666,000	$8,262,000	$9,928,000
Other Federal-Aid Programs & Discretionary Funds (e.g. APD, ARRA, TIGER, FLAP, NHFP) (80%/20%)	$400,000	$100,000	$500,000	1.03	$3,331,000	$16,524,000	$19,855,000
State (STA or SP and SPPR) Funds State Selected Projects (100% State)		$250,000	$250,000	1.03	$1,666,000	$8,262,000	$9,928,000
State (IMPROVE ACT) Funds State Funded Projects (100% State) [3]		$17,167,000	$17,167,000	1.00	$92,831,000	$10,171,000	$103,002,000
Local Funding (100% Local)		$1,600,000	$1,600,000	1.03	$10,660,000	$52,875,000	$63,535,000
Total	**$7,600,000**	**$20,667,000**	**$28,267,000**		**$166,785,000**	**$376,995,000**	**$543,780,000**

[1] Based on a review of historic funding levels to the MTPO region.
[2] Revenue forecasts assume a 3 percent annual growth rate of funding.
Projections rounded to the nearest thousands
[3] Estimated Annual Average revenues are derived from IMPROVE Act totals and are not inflated.

Draft 9/27/17

Johnson City MTPO
2045 Metropolitan Transportation Plan
Revenue Forecasts

Streets & Highways - Operations and Maintenance Funding

Revenue Source	Annual Average [1]	Inflation Factor [2]	Revenue Projections		
			2025 Horizon Year	2045 Horizon Year	Total 2020-2045
City of Bluff City - State & Local Gas/State Aid Funds	$ 225,000	1.03	$ 1,499,000	$ 7,436,000	$ 8,935,000
City of Elizabethton - State & Local Gas/State Aid Funds	$ 2,159,000	1.03	$ 14,384,000	$ 71,349,000	$ 85,733,000
City of Johnson City - State & Local Gas/State Aid Funds	$ 9,624,000	1.03	$ 64,120,000	$ 318,046,000	$ 382,166,000
Town of Jonesborough - State & Local Gas/State Aid Funds	$ 685,000	1.03	$ 4,564,000	$ 22,637,000	$ 27,201,000
Town of Unicoi - State & Local Gas/State Aid Funds	$ 404,000	1.03	$ 2,692,000	$ 13,351,000	$ 16,043,000
City of Watauga - State & Local Gas/State Aid Funds	$ 43,000	1.03	$ 286,000	$ 1,421,000	$ 1,707,000
Carter County - State & Local Gas/State Aid Funds [3]	$ 3,192,000	1.03	$ 21,267,000	$ 105,487,000	$ 126,754,000
Sullivan County - State & Local Gas/State Aid Funds [3]	$ 8,034,000	1.03	$ 53,526,000	$ 265,501,000	$ 319,027,000
Unicoi County - State & Local Gas/State Aid Funds [3]	$ 1,700,000	1.03	$ 11,326,000	$ 56,180,000	$ 67,506,000
Washington County - State & Local Gas/State Aid Funds [3]	$ 7,144,000	1.03	$ 47,597,000	$ 236,089,000	$ 283,686,000
TDOT (Various State Sources) [4]	$ 7,198,000	1.03	$ 47,956,000	$ 237,874,000	$ 285,830,000
Total	**$ 40,408,000**		**$ 269,217,000**	**$ 1,335,371,000**	**$ 1,604,588,000**

[1] Annual average revenues are based on a review of historic funding levels to the MTPO region
[2] Revenue forecasts assume a 3 percent annual growth rate of funding unless otherwise noted
[3] County maintenance funds shown are for the complete counties of Carter, Sullivan, Washington, and Unicoi Counties
[4] TDOT maintenance funds shown are for state maintained roadways for the complete counties of Carter, Sullivan, Washington, and Unicoi Counties
Projections rounded to the nearest thousands

DRAFT - 9/13/17

Johnson City MTPO
2045 Metropolitan Transportation Plan
Revenue Forecasts

Transit - Operating Funding

Revenue Source	Annual Average [1]	Inflation Factor [2]	Revenue Projections		
			2025 Horizon Year	2045 Horizon Year	Total 2020-2045
Urbanized Area Services					
Operating Assistance - FTA 5307 (Federal) 50%	$ 1,665,000	1.03	$ 11,093,000	$ 55,024,000	$ 66,117,000
Operating Assistance (Non-Federal March) 50%	$ 1,665,000	1.03	$ 11,093,000	$ 55,024,000	$ 66,117,000
FTA 5307 Total	**$ 3,330,000**		**$ 22,186,000**	**$ 110,048,000**	**$ 132,234,000**
JCT & Other Transit Providers Including NET Trans					
Operating Assistance - Other FTA Programs (Federal) 50%	$ 140,000	1.03	$ 933,000	$ 4,627,000	$ 5,560,000
Operating Assistance - Other FTA Programs (Non-Federal Match) 50%	$ 140,000	1.03	$ 933,000	$ 4,627,000	$ 5,560,000
Other FTA Programs (FTA 5310) & Discretionary Funds [3] Total	**$ 280,000**		**$ 1,866,000**	**$ 9,254,000**	**$ 11,120,000**
Total Operating Assistance	**$ 3,610,000**		**$ 24,052,000**	**$ 119,302,000**	**$ 143,354,000**

[1] Based on a review of historic funding levels to the MTPO region (MTPO TIPs - FY2008-2011, FY2011-2014, FY2014-2017, and FY2017-2020)
[2] Revenue forecasts assume a 3 percent annual growth rate of funding.
[3] Conservative estimate of FTA funds likely to be available within the MTPO region over the 28-Year Planning Horizon
Projections rounded to the nearest thousands

Draft - 9/13/17

Johnson City MTPO
2045 Metropolitan Transportation Plan
Revenue Forecasts

Transit - Capital Funding

Revenue Source	Annual Average [1]	Inflation Factor [2]	Revenue Projections		
			2025 Horizon Year	2045 Horizon Year	Total 2020-2045
Urbanized Area Services					
Capital Assistance - FTA 5307 (Federal) 80%	$ 160,800	1.03	$ 1,071,000	$ 5,314,000	$ 6,385,000
Capital Assistance - (Non-Federal Match) 20%	$ 40,200	1.03	$ 268,000	$ 1,328,000	$ 1,596,000
FTA 5307 Total	**$ 201,000**		**$ 1,339,000**	**$ 6,642,000**	**$ 7,981,000**
JCT & Other Transit Providers Including NET Trans					
Capital Assistance - Other FTA Programs (Federal) 80%	$ 553,600	1.03	$ 3,688,000	$ 18,295,000	$ 21,983,000
Capital Assistance - Other FTA Programs (Non-Federal Match) 20%	$ 138,400	1.03	$ 922,000	$ 4,574,000	$ 5,496,000
Other FTA Programs (FTA 5310, 5339) & Discretionary Funds [3] Total	**$ 692,000**		**$ 4,610,000**	**$ 22,869,000**	**$ 27,479,000**
Total Capital Assistance	**$ 893,000**		**$ 5,949,000**	**$ 29,511,000**	**$ 35,460,000**

[1] Based on a review of historic funding levels to the MTPO region (MTPO TIPs - FY2008-2011, FY2011-2014, FY2014-2017, and FY2017-2020)

[2] Revenue forecasts assume a 3 percent annual growth rate of funding.

[3] Conservative estimate of FTA funds likely to be available within the MTPO region over the 28-Year Planning Horizon

Projections rounded to the nearest thousands

Draft - 9/13/17

Johnson City MTPO
2045 Metropolitan Transportation Plan
Financial Plan – Historic Revenues and Expenditures

Johnson City MTPO
2045 Metropolitan Transportation Plan
Capital Revenues/Expenditures - Historic
Federal Funds

Funding Source*	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	Total	Average
Surface Transportation Block Grant Program - Local (STBG-Local)	$4,775,054	$575,128	$5,718,400	$6,877,360	$1,176,000	$290,000	$660,000	$20,071,942	$2,900,000
Surface Transportation Block Grant Program - State (STBG-State)	$1,040,000	$360,000	$3,134,400	$791,813	$641,813	$641,813	$641,813	$7,251,652	$1,000,000
Advance Construction - National Highway Performance Program (ACNHPP)	$0			$0	$0	$0	$0	$0	$0
National Highway Performance Program (NHPP)	$260,000	$548,000	$6,470,000	$902,488	$272,488	$272,488	$272,488	$8,997,952	$1,300,000
Federal Lands Access Program (FLAP)	$612,000	$0	$0	$0	$0	$0	$0	$612,000	$100,000
High Priority Project - Federal Earmark (HPP)	$7,522,533	$578,313	$0	$0	$4,125,200	$0	$0	$12,226,046	$1,700,000
Highway Safety Improvement Program (HSIP)	$1,800,000	$1,800,000	$1,800,000	$1,682,386	$557,386	$557,386	$557,386	$8,754,544	$1,300,000
Penalty-Highway Safety Improvement Program (PHSIP)	$0	$100,000	$590,960	$2,887,775	$8,750	$8,750	$8,750	$3,604,985	$500,000
Safety Improvement Program (SIP)	$0	$35,000	$0	$0	$0	$0	$0	$35,000	$0
Safe Routes to School (SRTS)	$500,000	$0	$0	$0	$0	$0	$0	$500,000	$100,000
Transportation Alternatives Program (State) (TAP)	$664,000	$0	$0	$0	$0	$0	$0	$664,000	$100,000
Transportation Enhancement Program - Grouping (ENH)	$0	$0	$0	$578,475	$0	$0	$0	$578,475	$100,000
Total	$17,173,587	$3,996,441	$17,713,760	$13,720,297	$6,781,637	$1,770,437	$2,140,437	$63,296,596	$9,100,000

* Federal share only

Sources JCMTPO Fiscal Years 2014-2017 & 2017-2020 Transportation Improvement Programs

Johnson City MTPO
2045 Metropolitan Transportation Plan
Operations and Maintenance Revenues/Expenditures - Historic
County and TDOT

County - Historic							
Carter County **Detailed Expenditure Accounts**	**FY 2010**	**FY 2011**	**FY 2012**	**FY 2013**	**FY 2014**	**FY 2015**	**Average Annual***
Administration	$215,911	$230,011	$306,177	$308,513	$316,942	$358,712	
Asphalt Plant Operations	$0	$0	$0	$0	$0	$0	
Capital Outlay	$108,103	$205,369	$376,531	$231,453	$211,528	$233,677	$228,000
Highway and Bridge Maintenance	$1,415,956	$1,670,104	$1,818,945	$2,180,798	$2,301,244	$2,146,354	
Operation and Maintenance of Equipment	$508,769	$700,221	$691,914	$808,981	$781,382	$645,486	
Other Charges	$524,758	$626,447	$132,170	$145,109	$155,227	$159,160	
Traffic Control	$0	$0	$0	$0	$0	$0	
Total	**$2,773,497**	**$3,432,152**	**$3,325,737**	**$3,674,854**	**$3,766,323**	**$3,543,391**	**$3,419,000**
Total (Without Capital Outlay)	**$2,665,394**	**$3,226,783**	**$2,949,206**	**$3,443,401**	**$3,554,795**	**$3,309,714**	**$3,192,000**

Sullivan County **Detailed Expenditure Accounts**	**FY 2010**	**FY 2011**	**FY 2012**	**FY 2013**	**FY 2014**	**FY 2015**	**Average Annual***
Administration	$297,907	$296,350	$291,810	$311,688	$321,697	$355,043	
Asphalt Plant Operations	$683,043	$855,640	$1,303,014	$1,278,869	$1,237,834	$1,096,571	
Capital Outlay	$304,289	$183,940	$180,982	$264,662	$676,685	$316,804	$321,000
Highway and Bridge Maintenance	$6,687,642	$6,227,151	$5,713,078	$5,555,281	$5,581,894	$5,654,355	
Operation and Maintenance of Equipment	$644,049	$586,033	$565,136	$605,693	$626,710	$625,078	
Other Charges	$87,376	$88,671	$78,716	$90,856	$92,688	$219,702	
Traffic Control	$10,727	$12,505	$24,203	$30,153	$27,781	$39,949	
Total	**$8,715,033**	**$8,250,290**	**$8,156,939**	**$8,137,202**	**$8,565,289**	**$8,306,702**	**$8,355,000**
Total (Without Capital Outlay)	**$8,410,744**	**$8,066,350**	**$7,975,957**	**$7,872,540**	**$7,888,604**	**$7,990,698**	**$8,034,000**

Unicoi County **Detailed Expenditure Accounts**	**FY 2010**	**FY 2011**	**FY 2012**	**FY 2013**	**FY 2014**	**FY 2015**	**Average Annual***
Administration	$112,064	$114,805	$118,898	$118,721	$118,289	$134,616	
Asphalt Plant Operations	$0	$0	$0	$0	$0	$0	
Capital Outlay	$374,029	$443,356	$73,477	$57,599	$502,797	$721,466	$362,000
Highway and Bridge Maintenance	$860,257	$911,619	$930,254	$1,070,373	$1,094,720	$865,969	
Operation and Maintenance of Equipment	$184,846	$230,611	$240,407	$206,307	$211,146	$183,681	
Other Charges	$357,473	$398,981	$406,721	$440,983	$462,697	$425,755	
Traffic Control	$0	$0	$0	$0	$0	$0	
Total	**$1,888,669**	**$2,099,372**	**$1,769,757**	**$1,893,979**	**$2,389,649**	**$2,331,487**	**$2,062,000**
Total (Without Capital Outlay)	**$1,514,640**	**$1,656,016**	**$1,696,280**	**$1,836,384**	**$1,886,852**	**$1,610,021**	**$1,700,000**

Washington County **Detailed Expenditure Accounts**	**FY 2010**	**FY 2011**	**FY 2012**	**FY 2013**	**FY 2014**	**FY 2015**	**Average Annual***
Administration	$595,436	$556,446	$653,115	$552,369	$575,923	$641,858	
Asphalt Plant Operations	$2,598,202	$2,318,485	$2,900,591	$2,626,579	$3,268,802	$3,170,146	
Capital Outlay	$386,643	$87,869	$448,512	$779,875	$1,643,318	$531,309	$646,000
Highway and Bridge Maintenance	$2,155,648	$2,040,025	$2,462,929	$2,172,787	$2,334,350	$2,170,078	
Operation and Maintenance of Equipment	$730,519	$761,256	$786,462	$849,271	$794,937	$811,965	
Other Charges	$825,555	$1,166,714	$1,166,000	$138,554	$155,393	$206,558	
Traffic Control	$0	$100,972	$131,356	$152,602	$140,171	$133,850	
Total	**$7,292,003**	**$7,031,767**	**$8,568,985**	**$7,272,037**	**$8,912,894**	**$7,665,764**	**$7,791,000**
Total (Without Capital Outlay)	**$6,905,360**	**$6,943,898**	**$8,120,473**	**$6,492,162**	**$7,269,576**	**$7,134,455**	**$7,144,000**

* Rounded
Source: http://www.comptroller.tn.gov/TAG/tag.aspx

Tennessee DOT - Historic							
Carter County	**FY 2010**	**FY 2011**	**FY 2012**	**FY 2013**	**FY 2014**	**FY 2015**	**Average Annual***
Bridge Replacement	$50,200	$50,200	$50,200	$50,211	$50,211	$165,341	
Highway Betterments and Maintenance	$1,055,300	$1,126,100	$973,300	$1,081,418	$1,411,509	$1,176,068	
Safe Growth Grants - Litter	$36,100	$36,100	$50,800	$10,000	$10,000	$5,000	
State Aid	$207,800	$207,800	$231,000	$202,256	$202,256	$490,049	
Highway Construction	$2,590,000	$9,160,000	$0	$0	$0	$0	
	$3,939,400	**$10,580,200**	**$1,305,300**	**$1,343,885**	**$1,673,976**	**$1,836,458**	
TDOT O & M	**$1,349,400**	**$1,420,200**	**$1,305,300**	**$1,343,885**	**$1,673,976**	**$1,836,458**	**$1,488,000**

Sullivan County	**FY 2010**	**FY 2011**	**FY 2012**	**FY 2013**	**FY 2014**	**FY 2015**	**Average Annual***
Bridge Replacement	$74,500	$69,400	$92,000	$80,672	$87,603	$68,722	
Highway Betterments and Maintenance	$2,278,800	$2,454,300	$1,585,800	$1,649,026	$1,813,528	$1,721,698	
Safe Growth Grants - Litter	$66,100	$66,100	$83,900	$325,891	$327,017	$242,135	
State Aid	$305,100	$305,100	$335,900	$294,016	$294,016	$712,406	
Highway Construction	$1,096,000	$1,390,000	$2,740,000	$0	$0	$0	
	$3,820,500	**$4,284,900**	**$4,837,600**	**$2,349,605**	**$2,522,164**	**$2,744,961**	
TDOT O & M	**$2,724,500**	**$2,894,900**	**$2,097,600**	**$2,349,605**	**$2,522,164**	**$2,744,961**	**$2,566,000**

Unicoi County	**FY 2010**	**FY 2011**	**FY 2012**	**FY 2013**	**FY 2014**	**FY 2015**	**Average Annual***
Bridge Replacement	$50,200	$85,000	$85,100	$95,128	$93,015	$76,397	
Highway Betterments and Maintenance	$732,000	$775,200	$911,100	$1,107,768	$950,489	$792,487	
Safe Growth Grants - Litter	$29,200	$29,200	$39,200	$0	$15,000	$20,000	
State Aid	$150,900	$150,900	$171,300	$149,953	$149,953	$363,348	
Highway Construction	$1,160,000	$1,000,000	$0	$0	$0	$0	
	$2,122,300	**$2,040,300**	**$1,206,700**	**$1,352,849**	**$1,208,457**	**$1,252,232**	
TDOT O & M	**$962,300**	**$1,040,300**	**$1,206,700**	**$1,352,849**	**$1,208,457**	**$1,252,232**	**$1,170,000**

Washington County	**FY 2010**	**FY 2011**	**FY 2012**	**FY 2013**	**FY 2014**	**FY 2015**	**Average Annual***
Bridge Replacement	$90,800	$97,000	$50,200	$70,862	$69,891	$50,211	
Highway Betterments and Maintenance	$1,294,300	$1,385,500	$1,548,700	$1,637,109	$1,386,547	$1,209,618	
Safe Growth Grants - Litter	$53,300	$53,300	$71,900	$361,309	$315,467	$238,651	
State Aid	$251,200	$251,200	$291,000	$254,783	$254,783	$617,274	
Highway Construction	$6,229,000	$4,360,000	$380,000	$0	$0	$0	
	$7,918,600	**$6,147,000**	**$2,341,800**	**$2,324,063**	**$2,026,688**	**$2,115,754**	
TDOT O & M	**$1,689,600**	**$1,787,000**	**$1,961,800**	**$2,324,063**	**$2,026,688**	**$2,115,754**	**$1,984,000**

TDOT (Carter, Sullivan, Unicoi, & Washington Counties)	**$6,725,800**	**$7,142,400**	**$6,571,400**	**$7,370,402**	**$7,431,285**	**$7,949,405**	**$7,158,000**

* Rounded
Source: http://www.capitol.tn.gov/joint/staff/budget-analysis/county-reports/

Johnson City MTPO
2045 Metropolitan Transportation Plan
Operations and Maintenance Revenues/Expenditures - Historic
Municipalities

City of Bluff City	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	Average Annual Highway & Streets Budget*
Total Primary Government Expenses	$1,704,979	$2,189,592	$2,476,075	$2,436,594	$2,385,320	$2,252,409	
Highway & Streets	$176,074	$212,469	$435,944	$450,663	$453,650	$315,994	$341,000
% of Total Budget	10%	10%	18%	18%	19%	14%	
State-Shared Funds	**$185,052**	**$194,359**	**$242,890**	**$229,605**	**$258,005**	**$240,217**	**$225,000**
Gasoline & Motor Fuel Tax	$39,708	$42,908	$30,578	$30,423	$30,730	$31,209	$34,000
Gasoline & Motor Fuel Tax - Gas 3 Cent			$9,162	$9,128	$9,156	$9,284	$9,000
Gasoline & Motor Fuel Tax - Gas 1989			$4,936	$4,918	$4,933	$5,002	$5,000
Petroleum Special			$3,539	$3,551	$3,547	$3,537	$4,000
City Streets and Transportation	$3,352	$3,067					$3,000
All Other State-Shared Taxes	$141,992	$148,384	$194,675	$181,585	$209,639	$191,185	$178,000

City of Elizabethton	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	Average Annual Highway & Streets Budget*
Total Governmental Activities Expenses	$18,745,686	$16,534,934	$13,430,662	$13,741,552	$19,012,916	$13,728,628	
Public Works	$1,892,643	$2,096,641	$1,804,323	$1,958,961	$2,334,992	$2,091,850	$2,030,000
% of Total Expenses	10%	13%	13%	14%	12%	15%	
State-Shared Funds	**$2,198,437**	**$2,104,543**	**$2,170,083**	**$2,121,271**	**$2,212,049**	**$2,145,253**	**$2,159,000**
Gasoline & Motor Fuel Tax	$285,999	$261,977	$252,230	$248,862	$251,378	$255,294	$259,000
Gasoline & Motor Fuel Tax - Gas 3 Cent	$55,209	$78,754	$75,608	$74,875	$74,897	$75,947	$73,000
Gasoline & Motor Fuel Tax - Gas 1989	$29,746	$42,432	$40,737	$40,234	$40,354	$40,920	$39,000
Petroleum Special	$22,574	$30,086	$29,182	$29,053	$29,021	$28,934	$28,000
City Streets and Transportation	$7,526						$8,000
All Other State-Shared Taxes	$1,797,383	$1,691,294	$1,772,327	$1,728,447	$1,816,398	$1,744,159	$1,758,000

City of Johnson City	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	Average Annual Highway & Streets Budget*
Total Primary Government Expenses	$130,307,382	$135,574,586	$137,855,181	$143,541,530	$138,276,131	$133,902,710	
Public Works	$15,041,881	$14,922,121	$12,036,441	$12,642,482	$12,651,427	$12,650,544	$13,324,000
% of Total Budget	12%	11%	9%	9%	9%	9%	
State-Shared Funds	**$8,244,943**	**$9,166,477**	**$9,717,629**	**$9,976,138**	**$10,217,445**	**$10,432,787**	**$9,624,000**
Gasoline & Motor Fuel Tax	$1,161,135	$1,063,961	$1,114,488	$1,108,845	$1,119,853	$1,137,297	$1,118,000
Gasoline & Motor Fuel Tax - Gas 3 Cent	$224,220	$319,843	$333,943	$332,864	$333,657	$338,333	$314,000
Gasoline & Motor Fuel Tax - Gas 1989	$120,808	$172,329	$179,923	$179,237	$179,771	$182,291	$169,000
Petroleum Special	$91,678	$122,187	$129,015	$129,426	$129,284	$128,896	$122,000
City Streets and Transportation	$30,537						$31,000
All Other State-Shared Taxes	$6,616,565	$7,478,158	$7,960,260	$8,226,166	$8,454,879	$8,645,971	$7,897,000

Town of Jonesborough	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	Average Annual Highway & Streets Budget*
Total Primary Government Expenses	$11,350,956	$11,235,433	$5,930,102	$6,511,713	$6,873,344	$6,755,684	
Streets Department	$1,054,357	$811,742	$769,526	$785,721	$1,028,014	$735,247	$864,000
% of Total Expenses	9%	7%	13%	12%	15%	11%	
State-Shared Funds	**$566,928**	**$616,969**	**$653,652**	**$731,495**	**$722,105**	**$820,282**	**$685,000**
Gasoline & Motor Fuel Tax	$88,022	$86,283	$89,294	$88,671	$89,568	$90,963	$89,000
Gasoline & Motor Fuel Tax - Gas 3 Cent	$16,992	$25,928	$26,758	$26,607	$26,686	$27,060	$25,000
Gasoline & Motor Fuel Tax - Gas 1989	$9,155	$13,970	$14,417	$14,336	$14,378	$14,580	$13,000
Petroleum Special	$6,947	$9,915	$10,336	$10,352	$10,340	$10,309	$10,000
City Streets and Transportation	$2,316						$2,000
All Other State-Shared Taxes	$443,496	$480,874	$512,847	$591,530	$581,132	$677,369	$548,000

Town of Unicoi	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	Average Annual Highway & Streets Budget*
Total Governmental Activities	$1,070,167	$1,086,550	$1,225,744	$1,371,329	$1,291,759	$1,419,295	
Public Works	$379,909	$440,470	$396,477	$525,248	$250,016	$265,436	$376,000
% of Total Expenses	35%	41%	32%	38%	19%	19%	
State-Shared Funds	**$373,324**	**$392,676**	**$401,090**	**$410,004**	**$414,141**	**$433,666**	**$404,000**
Gasoline & Motor Fuel Tax	$71,799	$65,769	$64,503	$63,760	$64,405	$65,408	$66,000
Gasoline & Motor Fuel Tax - Gas 3 Cent	$7,467	$19,771	$19,333	$19,132	$19,189	$19,458	$17,000
Gasoline & Motor Fuel Tax - Gas 1989	$13,860	$10,652	$10,418	$10,308	$10,339	$10,484	$11,000
Petroleum Special	$5,667	$7,553	$7,463	$7,444	$7,435	$7,413	$7,000
City Streets and Transportation	$1,889						$2,000
All Other State-Shared Taxes	$272,642	$288,931	$299,375	$309,359	$312,772	$330,903	$302,000

City of Watauga	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	Average Annual Highway & Streets Budget*
Total Primary Government Expenses	$201,496	$235,150	$446,462	$491,556	$211,991	$200,272	
Highways and Streets	$14,568	$10,594	$15,729	$7,850	$8,902	$8,925	$11,000
% of Total Budget	7%	5%	4%	2%	4%	4%	
State-Shared Funds	**$29,269**	**$28,187**	**$49,607**	**$50,414**	**$46,137**	**$55,106**	**$43,000**
Gasoline & Motor Fuel Tax	$6,365	$6,048	$8,066	$8,040	$8,121	$8,248	$7,000
Gasoline & Motor Fuel Tax - Gas 3 Cent	$1,901	$1,806	$2,416	$2,412	$2,419	$2,453	$2,000
Gasoline & Motor Fuel Tax - Gas 1989	$1,024	$973	$1,302	$1,299	$1,303	$1,322	$1,000
Petroleum Special	$733	$697	$933	$938	$937	$934	$1,000
City Streets and Transportation	$937	$871					$1,000
All Other State-Shared Taxes	$18,308	$17,791	$36,890	$37,725	$33,357	$42,149	$31,000

* Rounded
Source: http://www.comptroller.tn.gov/RA_MA_Financial/

Johnson City MTPO
2045 Metropolitan Transportation Plan
Revenues/Expenditures - Historic
Local Capital Funding

Review of Bluff City Local Transportation Capital Outlay Expenditures

FY 2010 Highway & Streets

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	157,432	165,162		165,162
Capital Outlay	1,000	1,000	174	826
Total	158,432	166,162	174	165,988

FY 2011 Highway & Streets

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	226,200	202,249	-	202,249
Capital Outlay	70,000	39,634		39,634
Total	296,200	241,883		241,883

FY 2012 Highway & Streets

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	804,961	400,884	412,568	(11,684)
Capital Outlay	25,000	6,109	17,109	(11,000)
Total	829,961	406,993	429,677	(22,684)

FY 2013 Highway & Streets

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	622,768	492,459	494,105	(1,646)
Capital Outlay	111,000	88,780	88,780	-
Total	733,768	581,239	582,885	(1,646)

FY 2014 Highway & Streets

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	417,330	429,944	423,937	6,007
Capital Outlay	7,900	4,942	-	-
Total	425,230	434,886	428,879	6,007

FY 2015 Highway & Streets

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	315,514	315,514	618,960	(303,446)
Capital Outlay	11,000	11,000	10,451	549
Total	326,514	326,514	629,411	(302,897)

Annual Average Capital
$24,287

Source: Bluff City Financial Statements 2010 - 2015

Review of City of Elizabethton Local Transportation Capital Outlay Expenditures

FY 2010 Public Works

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	1,146,563	1,096,047	1,049,919	46,128
Capital Outlay	34,700	49,200	7,802	41,399
Total	1,181,263	1,145,247	1,057,721	87,526

FY 2011 Public Works

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	1,258,757	1,258,757	1,197,637	61,120
Capital Outlay	-	-	12,004	(12,004)
Total	1,258,757	1,258,757	1,209,641	49,116

FY 2012 Public Works

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	1,301,551	1,248,749	1,098,692	150,057
Capital Outlay	45,820	98,622	98,191	431
Total	1,347,371	1,347,371	1,196,883	150,488

FY 2013 Public Works

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	1,361,570	1,254,422	1,143,716	110,706
Capital Outlay	18,626	25,077	25,868	(791)
Total	1,380,196	1,279,499	1,169,584	109,915

FY 2014 Public Works

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	1,436,014	1,354,871	1,226,154	128,717
Capital Outlay	172,486	239,329	233,029	6,300
Total	1,607,500	1,594,200	1,459,183	135,017

FY 2015 Public Works

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	2,033,379	2,017,781	1,836,272	181,509
Capital Outlay	284,890	452,012	408,319	43,692
Total	2,318,269	2,470,793	2,245,591	225,202

Annual Average Capital
$131,036

Source: City of Elizabethton Financial Statements 2010 - 2015

Review of City of Johnson City Local Transportation Capital Outlay Expenditures

FY 2010 Public Works

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	10,975,701	10,975,701	11,061,517	(85,816)
Capital Outlay	158,209	158,209	158,209	-
Total	11,133,909	11,133,909	11,219,725	(85,816)

FY 2011 Public Works

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	10,912,802	11,112,802	11,106,348	6,454
Capital Outlay	161,144	161,144	161,144	-
Total	11,073,946	11,273,946	11,267,492	6,454

FY 2012 Public Works

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	10,776,719	10,983,049	10,663,469	319,580
Capital Outlay	162,774	162,774	162,774	-
Total	10,939,493	11,145,823	10,826,243	319,580

FY 2013 Public Works

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	11,190,538	11,190,538	11,355,898	(165,360)
Capital Outlay	165,791	165,791	165,791	-
Total	11,356,329	11,356,329	11,521,689	(165,360)

FY 2014 Public Works

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	11,519,993	11,586,570	11,555,516	31,054
Capital Outlay	166,383	166,383	166,383	-
Total	11,686,376	11,752,953	11,721,899	31,054

FY 2015 Public Works

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	10,011,881	11,351,881	11,636,675	(284,814)
Capital Outlay	167,922	167,922	167,922	-
Total	10,179,703	11,519,703	11,804,597	(284,814)

Annual Average Capital*
$163,704

Source: City of Johnson City Financial Statements 2010 - 2015, * Does not depict local Bond Funds

Review of Town of Jonesborough Local Transportation Capital Outlay Expenditures

FY 2010 Streets Department

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	979,740	1,017,575	1,007,164	10,411
Capital Outlay	-	116,300	115,694	606
Total	979,740	1,133,875	1,122,858	11,017

FY 2011 Streets Department

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	585,767	755,780	755,599	181
Capital Outlay	-	-	-	-
Total	585,767	755,780	755,599	181

FY 2012 Streets Department

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	670,175	729,550	728,813	737
Capital Outlay	-	35,131	35,131	-
Total	670,175	764,681	763,944	737

FY 2013 Streets Department

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	708,953	710,795	710,642	123
Capital Outlay/Paving	65,000	56,700	56,695	5
Total	773,953	767,495	767,337	128

FY 2014 Streets Department

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	1,110,745	953,925	934,236	19,689
Capital Outlay/Paving	-	8,700	8,700	-
Total	1,110,745	962,625	942,936	19,689

FY 2015 Streets Department

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	792,355	731,760	729,341	2,419
Capital Outlay	-	84,412	84,412	-
Total	792,355	816,172	813,753	2,419

Annual Average Capital
$60,126

Source: Town of Jonesborough Financial Statements 2010 - 2015

Johnson City MTPO
2045 Metropolitan Transportation Plan
Revenues/Expenditures - Historic
Local Capital Funding

Review of Town of Unicoi Local Transportation Capital Outlay Expenditures

FY 2010 Public Works

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	363,941	405,798	379,909	25,889
Capital Outlay	-	-	-	-
Total	363,941	405,798	379,909	25,889

FY 2011 Public Works

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	362,964	362,964	440,470	(77,506)
Capital Outlay	-	-	-	-
Total	362,964	362,964	440,470	(77,506)

FY 2012 Public Works

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	343,175	343,175	396,477	(53,302)
Capital Outlay	-	-	-	-
Total	343,175	343,175	396,477	(53,302)

FY 2013 Public Works

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	331,400	331,400	525,248	(193,848)
Capital Outlay/Paving	-	-	-	-
Total	331,400	331,400	525,248	(193,848)

FY 2014 Public Works

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	410,122	410,122	241,889	168,233
Capital Outlay	10,700	10,700	8,127	2,573
Total	420,822	420,822	250,016	170,806

FY 2015 Public Works

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	327,501	327,501	262,876	64,625
Capital Outlay	8,400	8,400	2,500	5,840
Total	335,901	335,901	265,436	70,465

Annual Average Capital
$2,137

Source: Town of Unicoi Financial Statements 2010 - 2015

Review of City of Watauga Local Transportation Capital Outlay Expenditures

FY 2010 Highway & Streets

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	8,200	8,200	4,911	3,289
Capital Outlay	7,000	7,000	6,580	420
Total	15,200	15,200	11,491	3,709

FY 2011 Highway & Streets

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	11,500	11,500	6,959	4,541
Capital Outlay	5,000	5,000	523	4,477
Total	16,500	16,500	7,482	9,018

FY 2012 Highway & Streets

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	9,000	9,000	12,511	(3,511)
Capital Outlay	10,500	10,500	75	10,425
Total	19,500	19,500	12,586	6,914

FY 2013 Highway & Streets

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	8,000	8,000	5,704	2,296
Capital Outlay	3,000	3,000	425	2,575
Total	11,000	11,000	6,129	4,871

FY 2014 Highway & Streets

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	7,000	7,000	5,580	1,420
Capital Outlay	1,500	1,500	1,021	479
Total	8,500	8,500	6,601	1,899

FY 2015 Highway & Streets

Highways and Streets	Original Budget	Final Budget	Actual	Difference
Non-Capital Outlay	7,000	7,000	6,378	622
Capital Outlay	2,500	2,500	288	2,214
Total	9,500	9,500	6,664	2,836

Annual Average Capital
$1,485

Source: City of Watauga Financial Statements 2010 - 2015

Review of Carter, Sullivan, Unicoi, and Washington Counties' Local Transportation Capital Outlay Expenditures

Capital Outlay	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	2006-2015 Annual	Portion of MTPO Area	Assumed Capital*
Carter County	$53,948	$605,052	$209,671	$512,617	$108,103	$205,369	$376,531	$231,453	$211,528	$233,677	$274,795	58%	$158,007
Sullivan County	$130,336	$477,250	$917,019	$351,422	$304,289	$183,940	$180,982	$264,662	$676,685	$316,004	$380,259	3%	$11,969
Unicoi County	$302,114	$245,107	$839,869	$46,300	$374,029	$443,356	$73,477	$57,595	$502,797	$721,466	$370,611	0%	$0
Washington County	$153,935	$249,676	$43,375	$523,019	$386,643	$87,869	$446,512	$779,875	$1,643,318	$531,309	$483,053	68%	$329,080
											$1,508,518		$499,056

Annual Average Capital - Local	
County	$499,056
Municipalities	$382,775
Bond Funds	$3,769,817
Total	$4,652,209

Source: http://www.comptroller.tn.gov/TAO/lag.aspx
* Assumed Capital Funds is based on a proportional share of the county within the MTPO area

Johnson City MTPO
2045 Metropolitan Transportation Plan
Revenues/Expenditures - Historic
Local Bond Funding

Bond Issued	
2003	$921,038
2004	$2,090,751
2005	$0
2006	$8,249,610
2007	$7,000,000
2008	$0
2009	$0
2010	$12,242,223
2011	$0
2012	$3,239,146
2013	$3,030,475
2014	$1,189,948
2015	$134,136
2016	$14,680,110
Average	**$3,769,817**

Source: City of Johnson City Financial Statements 2010 - 2015

Johnson City MTPO
2045 Metropolitan Transportation Plan
Historic and FAST Act
Urban Transit Funding

Operating & Preventative Maintenance

Funding Source/Amount Allocated	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	Historic Average Annual (2008-2015)*	FAST Act Average Annual (2016-2020)*
FTA - 5307 - Operating Funds	$873,655	$971,090	$1,001,700	$1,075,000	$1,105,000	$1,200,000	$1,375,000	$1,455,000	$1,550,000	$1,590,000	$1,652,000	$1,695,000	$1,742,000	$1,132,000	$1,646,000
State Match Funds	$436,828	$449,311	$456,894	$466,000	$470,000	$468,000	$463,000	$624,500	$672,000	$663,500	$715,000	$716,000	$717,500	$479,000	$697,000
Local Match Funds	$436,828	$521,779	$544,896	$609,000	$635,000	$725,000	$912,000	$695,500	$878,000	$671,500	$673,000	$719,000	$745,500	$635,000	$737,000
Total Allocated	**$1,747,310**	**$1,942,179**	**$2,003,490**	**$2,150,000**	**$2,210,000**	**$2,393,000**	**$2,750,000**	**$2,775,000**	**$3,100,000**	**$2,925,000**	**$3,040,000**	**$3,130,000**	**$3,205,000**	**$2,246,000**	**$3,080,000**

Funding Source/Amount Allocated	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	Historic Average Annual (2008-2015)*	FAST Act Average Annual (2016-2020)*
FTA - 5307 - Preventive Maintenance & Capital Projects	$214,880	$212,200	$348,250	$374,970	$328,000	$529,817	$454,660	$390,000	$150,000	$256,000	$256,000	$169,000	$169,000	$357,000	$200,000
State Match Funds	$26,860	$26,525	$43,531	$46,871	$41,000	$57,692	$56,833	$48,750	$18,750	$32,000	$32,000	$20,000	$20,000	$44,000	$25,000
Local Match Funds	$26,860	$26,525	$43,531	$46,871	$41,000	$57,692	$56,833	$48,750	$18,750	$32,000	$32,000	$20,000	$20,000	$44,000	$25,000
Total Allocated	**$268,600**	**$265,250**	**$435,313**	**$468,712**	**$410,000**	**$645,201**	**$568,325**	**$487,500**	**$187,500**	**$320,000**	**$320,000**	**$209,000**	**$209,000**	**$445,000**	**$250,000**

Funding Source/Amount Allocated	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	Historic Average Annual (2008-2015)*	FAST Act Average Annual (2016-2020)*
FTA 5310 (formerly FTA 5317 - New Freedom Program)	$50,000	$100,000	$100,000	$125,000	$125,000	$268,000	$150,000	$100,000	$125,000	$125,000	$125,000	$150,000	$175,000	$127,000	$140,000
State Match Funds	$25,000	$50,000	$50,000	$62,500	$62,500	$66,000	$75,000	$50,000	$62,500	$62,500	$62,500	$75,000	$87,500	$55,000	$70,000
Local Match Funds	$25,000	$50,000	$50,000	$62,500	$62,500	$66,000	$75,000	$50,000	$62,500	$62,500	$62,500	$75,000	$87,500	$55,000	$70,000
Total Allocated	**$100,000**	**$200,000**	**$200,000**	**$250,000**	**$250,000**	**$400,000**	**$300,000**	**$200,000**	**$250,000**	**$250,000**	**$250,000**	**$300,000**	**$350,000**	**$237,000**	**$280,000**

Funding Source/Amount Allocated	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	Historic Average Annual (2008-2015)*	FAST Act Average Annual (2016-2020)*
FTA 5316 - Job Access/Reverse Commute (program eliminated)	$100,000	$100,000	$100,000	$150,000	$241,000	$150,000	$175,000							$145,000	$0
State Match Funds	$50,000	$50,000	$50,000	$75,000	$79,500	$75,000	$87,500							$67,000	$0
Local Match Funds	$50,000	$50,000	$50,000	$75,000	$79,500	$75,000	$87,500							$67,000	$0
Total Allocated	**$200,000**	**$200,000**	**$200,000**	**$300,000**	**$400,000**	**$300,000**	**$350,000**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$279,000**	**$0**
Total Operating & Preventative Maintenance Funding	**$2,316,910**	**$2,607,429**	**$2,838,713**	**$3,168,712**	**$3,270,000**	**$3,738,201**	**$3,968,325**	**$3,462,500**	**$3,537,500**	**$3,495,000**	**$3,610,000**	**$3,639,000**	**$3,764,000**	**$3,207,000**	**$3,610,000**

Capital

Funding Source/Amount Allocated	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	Historic Average Annual (2008-2015)*	FAST Act Average Annual (2016-2020)*
FTA - 5307 - Capital	$215,453	$212,200	$163,200	$228,250	$581,000	$228,250	$622,500	$249,000	$200,000	$110,000	$123,000	$155,000	$158,000	$312,000	$149,000
State Match Funds	$26,525	$26,525	$20,400	$23,375	$59,500	$23,375	$77,812	$25,500	$20,500	$72,225	$11,000	$13,500	$14,000	$35,000	$26,000
Local Match Funds	$26,622	$26,525	$20,400	$23,375	$59,500	$23,375	$77,813	$25,500	$20,500	$72,225	$11,000	$13,500	$14,000	$35,000	$26,000
Total Allocated	**$268,600**	**$265,250**	**$204,000**	**$275,000**	**$700,000**	**$275,000**	**$778,125**	**$300,000**	**$241,000**	**$254,450**	**$145,000**	**$182,000**	**$186,000**	**$382,000**	**$201,000**

Funding Source/Amount Allocated	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	Historic Average Annual (2008-2015)*	FAST Act Average Annual (2016-2020)*
FTA 5339 (formally FTA 5309) - Discretionary Capital Funding	$133,315	$300,000		$228,250	$581,000	$228,250	$72,180			$771,469	$170,000	$170,000		$257,000	$370,000
State Match Funds	$16,665	$30,725		$23,375	$59,500	$23,375	$7,392			$78,658	$15,000	$15,000		$27,000	$36,000
Local Match Funds	$16,665	$30,725		$23,375	$59,500	$23,375	$7,932			$78,658	$15,000	$15,000		$27,000	$36,000
Total Allocated	**$166,645**	**$361,450**	**$0**	**$275,000**	**$700,000**	**$275,000**	**$87,504**	**$0**	**$0**	**$928,785**	**$200,000**	**$200,000**	**$0**	**$311,000**	**$442,000**

Funding Source/Amount Allocated	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	FY2016	FY2017	FY2018	FY2019	FY2020	Historic Average Annual (2008-2015)*	FAST Act Average Annual (2016-2020)*
FTA 5310 - Elderly Persons & Persons with Disabilities	$90,066			$121,000		$268,000	$52,758	$140,000	$120,326	$280,000	$280,000	$200,000	$120,000	$134,000	$200,000
State Match Funds	$11,259			$15,125		$66,000	$6,595	$14,337	$15,040	$35,000	$35,000	$25,000	$15,000	$23,000	$25,000
Local Match Funds	$11,259			$15,125		$66,000	$6,595	$14,337	$15,041	$35,000	$35,000	$25,000	$15,000	$23,000	$25,000
Total Allocated	**$112,583**	**$0**	**$0**	**$151,250**	**$0**	**$400,000**	**$65,948**	**$168,674**	**$150,407**	**$350,000**	**$350,000**	**$250,000**	**$150,000**	**$180,000**	**$250,000**
Total Capital Funding	**$547,828**	**$626,700**	**$204,000**	**$701,250**	**$1,400,000**	**$950,000**	**$931,577**	**$468,674**	**$391,407**	**$1,533,235**	**$695,000**	**$632,000**	**$336,000**	**$873,000**	**$893,000**
Total Transit Funding	**$2,863,738**	**$3,234,129**	**$3,042,713**	**$3,869,962**	**$4,670,000**	**$4,688,201**	**$4,899,902**	**$3,931,174**	**$3,928,907**	**$5,028,235**	**$4,305,000**	**$4,271,000**	**$4,100,000**	**$4,080,000**	**$4,503,000**

* Rounded

Source: JC MTPO 2008-2011 TIP, 2011-2014 TIP, 2014-2017 TIP, and 2017-2020 TIP

Federal	$2,706,000
State	$879,000
Local	$919,000
Total	$4,503,000

Johnson City MTPO
2045 Metropolitan Transportation Plan
Historic
Non-Urban Transit Funding (NET Trans)

NET Trans (Operations)*	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	Annual Average
Operating Funds (Federal)	$ 939,470	$ 1,063,509	$ 1,174,916	$ 1,400,883	$ 820,435	$ 869,495	$ 936,931	$ 1,126,133	$ 1,071,819	$ 1,445,879	$ 1,084,947
Operating Funds (State)	$ 469,735	$ 531,754	$ 587,458	$ 700,441	$ 410,218	$ 434,747	$ 468,465	$ 563,066	$ 535,909	$ 722,939	$ 542,473
Operating Funds (Other)	$ 469,735	$ 531,754	$ 587,458	$ 700,441	$ 410,218	$ 434,747	$ 468,465	$ 563,066	$ 535,909	$ 722,939	$ 542,473
Operating Funds - Total	**$ 1,878,939**	**$ 2,127,017**	**$ 2,349,832**	**$ 2,801,765**	**$ 1,640,870**	**$ 1,738,989**	**$ 1,873,861**	**$ 2,252,265**	**$ 2,143,637**	**$ 2,891,757**	**$ 2,169,893**

NET Trans (Capital)*	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	FY2015	Annual Average
Capital Funds (Federal)	$ 111,200	$ -	$ 191,370	$ 145,562	$ 204,166	$ 250,321	$ -	$ 492,557	$ 272,534	$ 550,340	$ 221,805
Capital Funds (State)	$ 13,900	$ -	$ 23,921	$ 18,195	$ 25,521	$ 31,290	$ -	$ 61,570	$ 34,067	$ 68,793	$ 27,726
Capital Funds (Other)	$ 13,900	$ -	$ 23,921	$ 18,195	$ 25,521	$ 31,290	$ -	$ 61,570	$ 34,067	$ 68,793	$ 27,726
Capital Funds - Total	**$ 139,000**	**$ -**	**$ 239,212**	**$ 181,953**	**$ 255,207**	**$ 312,901**	**$ -**	**$ 615,696**	**$ 340,667**	**$ 687,925**	**$ 277,256**

* Funding splits (federal, state, and local shares) are an approximation
Source: First TN HRA Financial Statements FY2006 thru FY2015

Appendix III – Travel Demand Model Documentation

Technical Memorandum

JOHNSON CITY
TRAVEL DEMAND MODEL UPDATE

Developed for

JOHNSON CITY METROPOLITAN TRANSPORTATION PLANNING ORGANIZATION

Developed by

Kimley»Horn

In association with:

RPM Transportation Consultants
A DIVISION OF KCI TECHNOLOGIES INC.

November 14, 2017
Draft Version 2.0

TABLE OF CONTENTS

INTRODUCTION

RPM Transportation Consultants (RPM) and Kimley-Horn and Associates, Inc. (Kimley-Horn) are updating the Johnson City Travel Demand Model with a validated base year of 2015 for the Johnson City Metropolitan Transportation Planning Organization (MTPO). The model has a future year of 2045, with an interim model year 2025. The Johnson City MTPO currently serves the jurisdictions of Bluff City, Elizabethton, Johnson City, Jonesborough, part of Unicoi, and parts of Carter, Sullivan, and Washington Counties in Tennessee. The Model study area consists of Washington County, Carter County, Unicoi County, and parts of Sullivan County.

Chapter 1 of this memorandum documents the development process and the validation results of the base year 2015 model. Chapter 2 discusses the development of future year models.

This document references the "**Minimum Travel Demand Model Calibration and Validation Guidelines for State of Tennessee, Updated 2012**" in multiple locations. For reference, this document is abbreviated as "TN Guidelines".

CHAPTER 1 - BASE YEAR MODEL

1.0 TRAFFIC ANALYSIS ZONES (TAZ) AND EXTERNAL STATIONS

The Johnson City MTPO Metropolitan Planning Area (MPA) boundary includes the jurisdictions of Bluff City, Elizabethton, Johnson City, Jonesborough, part of Unicoi, and parts of Carter, Sullivan, and Washington Counties in Tennessee. The Model study area consists of Washington County, Carter County, Unicoi County, and parts of Sullivan County.

1.1 TAZ Structure

A TAZ is a geographic area that is used to divide the planning region into small, relatively homogeneous areas in terms of land use and activity. TAZs are used to represent travel within a model study area because it is not practical or feasible to model individual parcels for households and employment. Housing and employment data are aggregated to the TAZ data, and the TAZs are used through the model process to calculate the origin and destination of trips in the model.

The revised TAZ boundaries are mostly the same as the 2010 bear year Model and the 2010 Census TAZ boundaries. There are 269 internal TAZs in the proposed model. **Figure 1-1** shows the proposed TAZ boundaries.

New TAZ IDs were assigned for the TAZ and highway node layers. IDs less than 500 are reserved for TAZ IDs, external station IDs, and internal and external centroids in highway node layer. The numbering scheme is as follows:

- IDs 1 through 500 are reserved for internal TAZs. IDs 1 through 269 are used for 269 TAZs in the proposed model. The remaining space from 269 to 500 is reserved for future expansion.
- IDs 501 through 600 are reserved for external stations. IDs 501 through 539 are used for 39 external stations. The remaining space from 540 to 600 is reserved for future external stations.

1.2 Districts

For future year demographic and employment forecasting and travel model validation purposes, the TAZs in the study area are grouped into 8 planning districts. **Figure 1.2** shows the planning district boundaries. In the highway assignment validation process, highway traffic predicted by the model can also be compared with the observed traffic counts at the district level to identify over or under estimation problems at particular districts.

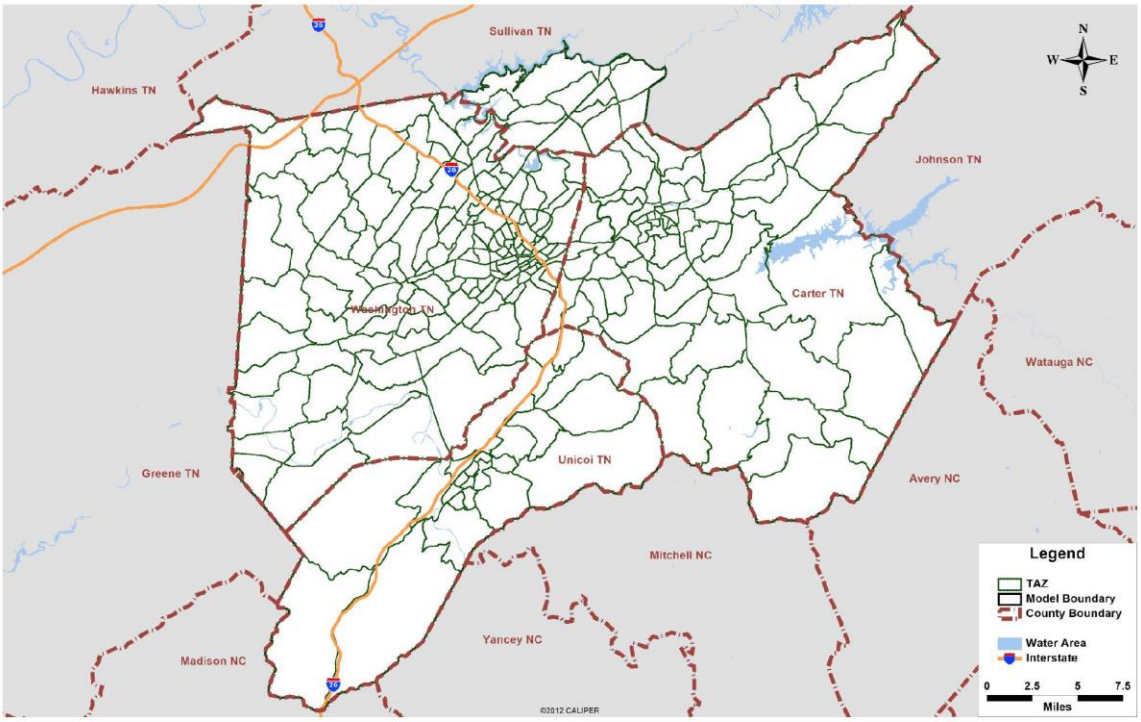


Figure 1-1 Traffic Analysis Zones

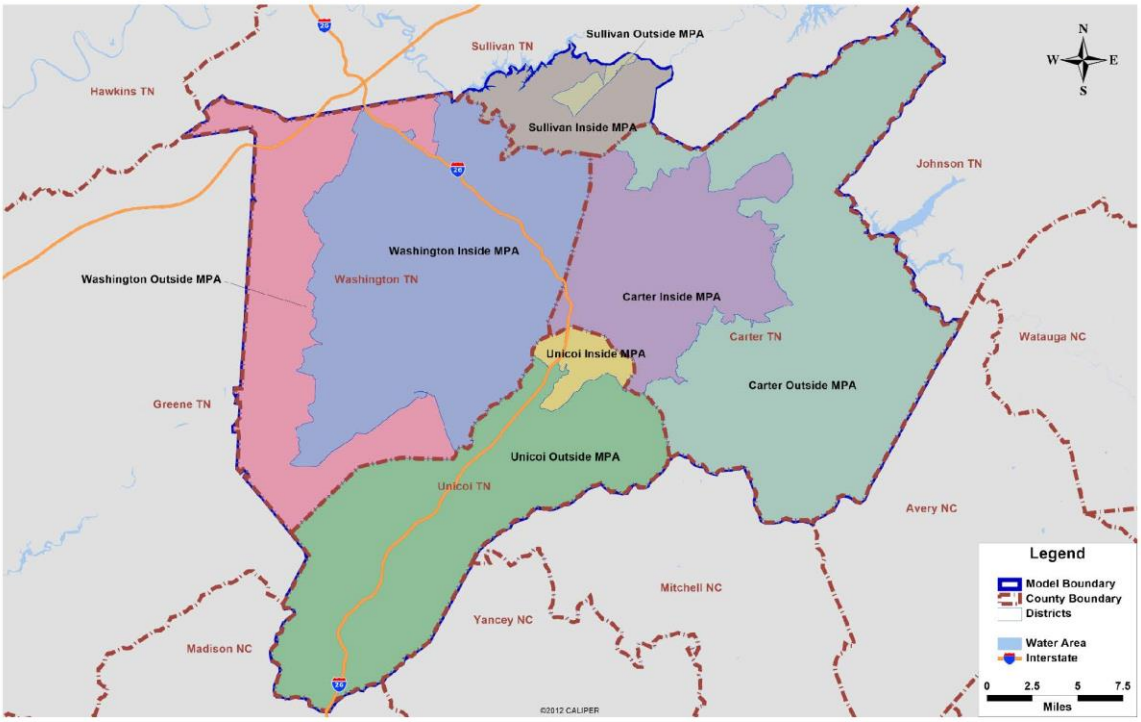


Figure 1-2 Planning Districts

1.3 Base Year Demographic and Employment Data

Given the multi-county structure of the Johnson City MTPO, the Woods & Poole 2015 Complete Economic and Demographic Data Source was used as county-level control totals for population within all four counties.

The process for determining the portion of each county's population that lies within the model study area for Tennessee counties began with an analysis of 2010 US Census data. Using this data at the block geography as well as Woods & Poole county-level estimates, the percentage of each county's population within the model study area was determined. Those proportions were held constant for each county, and it was assumed that in 2015, the same percentage of each county's population resided in the MTPO area as in 2010. The 2015 population for each county in the MTPO area was then calculated using the 2015 Woods & Poole county population and those percentages.

The sub-allocation of population and household data for the base year was derived using 2010 US Census data at the block level and allocated to the corresponding TAZ.

The total number of households for base year 2015 inside the model study area is 99,671, with a total population of 214,535. **Figure 1-3** shows the household density in units of number of households per acre.

To determine the base year employment within the MTPO area, 2015 InfoGroup data was purchased by the MTPO. This data was geocoded by address, cleaned, and allocated to the TAZs for 2015. The employment data was grouped to the following six categories by NAICS codes, as shown in **Table 1-1**.

Table 1-1 Employment Categories

Short Name in Model	Description	NAICS Code
Agr	Agricultural/mining/construction	11, 21, 23
Mfg	Manufacturing/transportation	22, 31-33, 42, 48-49
Retail	Retail	44-45
Office	Office	51, 52, 53, 54, 55, 56
Service	Service	61, 62, 71, 72, 81
Gov	Government	92, 99

Figure 2-4 is a color themed map showing the employment density in total number of employment per acre by TAZ.

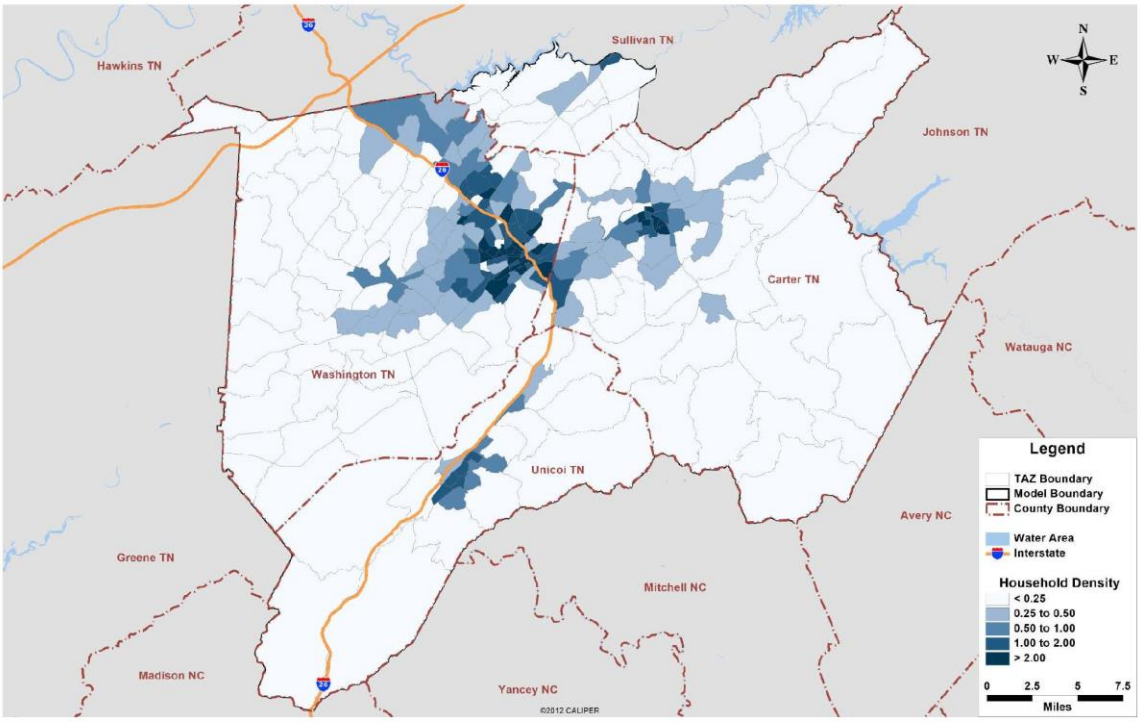


Figure 1-3 Household Density

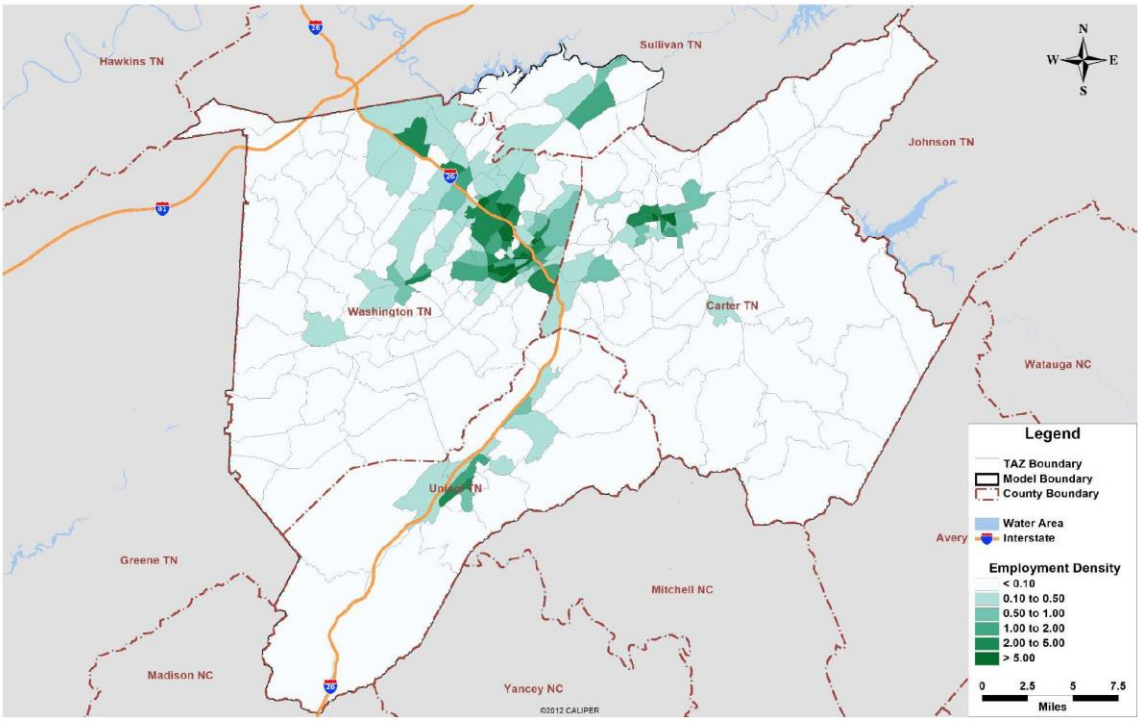


Figure 1-4 Employment Density

To cross-classify the total number of households for modeling purposes, the Census Transportation Planning Package 2010 (CTPP 2010) data set based on Census 2010 and American Community Survey (ACS) 2006-2010 5-year data were used. CTPP 2010 data was used to develop the following three cross-classification distributions for the Johnson City model:

- Household Size (number of persons) by vehicle ownership (number of vehicles owned per household),
- Household Size by number of children (age < 18) in household, and
- Number of workers in household by vehicle ownership.

Using the base year 2015 household control totals, the cross-classification distribution from the CTPP 2010 data was applied to each TAZ to obtain the number of households in each cross-classification bin. **Table 1-2** shows the percent distribution of households cross-classified by household size and vehicle ownership. **Table 1-3** shows the percent distribution of households cross-classified by household size and number of children. **Table 1-4** shows the percent distribution of households cross-classified by number of workers and vehicle ownership.

Table 1-2 Johnson City MTPO Household Size by Vehicle Ownership Cross-classification Distribution

Persons	Vehicles				Total
	0	1	2	3+	
1	4.0%	18.7%	5.2%	1.1%	29.0%
2	1.1%	8.1%	20.1%	9.4%	38.7%
3	0.4%	2.8%	6.2%	5.8%	15.2%
4+	0.3%	2.0%	7.3%	7.4%	17.1%
Total	5.9%	31.6%	38.8%	23.8%	100.0%

Table 1-3 Johnson City MTPO Household Size by Number of Children Cross-classification Distribution

Persons	Children			Total
	0	1	2+	
1	29.0%	0.0%	0.0%	29.0%
2	35.8%	2.9%	0.0%	38.7%
3	5.6%	8.1%	1.6%	15.3%
4+	1.4%	2.3%	13.3%	17.1%
Total	71.8%	13.4%	14.9%	100.0%

Table 1-4 Johnson City MTPO Number of Workers by Vehicle Ownership Cross-classification Distribution

Workers	Vehicles				Total
	0	1	2	3+	
0	4.6%	15.1%	10.3%	3.7%	33.6%
1	1.1%	14.9%	15.1%	7.3%	38.4%
2	0.1%	1.6%	12.8%	9.5%	24.0%
3+	0.1%	0.2%	0.5%	3.2%	3.9%
Total	5.8%	31.7%	38.7%	23.7%	100.0%

1.4 Base Year School Enrollment Data

K-12 school and college enrollment data was collected by the MTPO staff. MTPO staff recorded school enrollment data for base year 2015. The data was geocoded and totaled for each TAZ. **Figure 1-5 s**hows the school enrollment numbers by TAZ.

1.5 External Stations

There are a total of 39 external stations in the proposed 2015 model. **Figure 1-6** shows the external stations of the new model. Detailed external station data is presented separately in the external and truck model section of this memorandum.

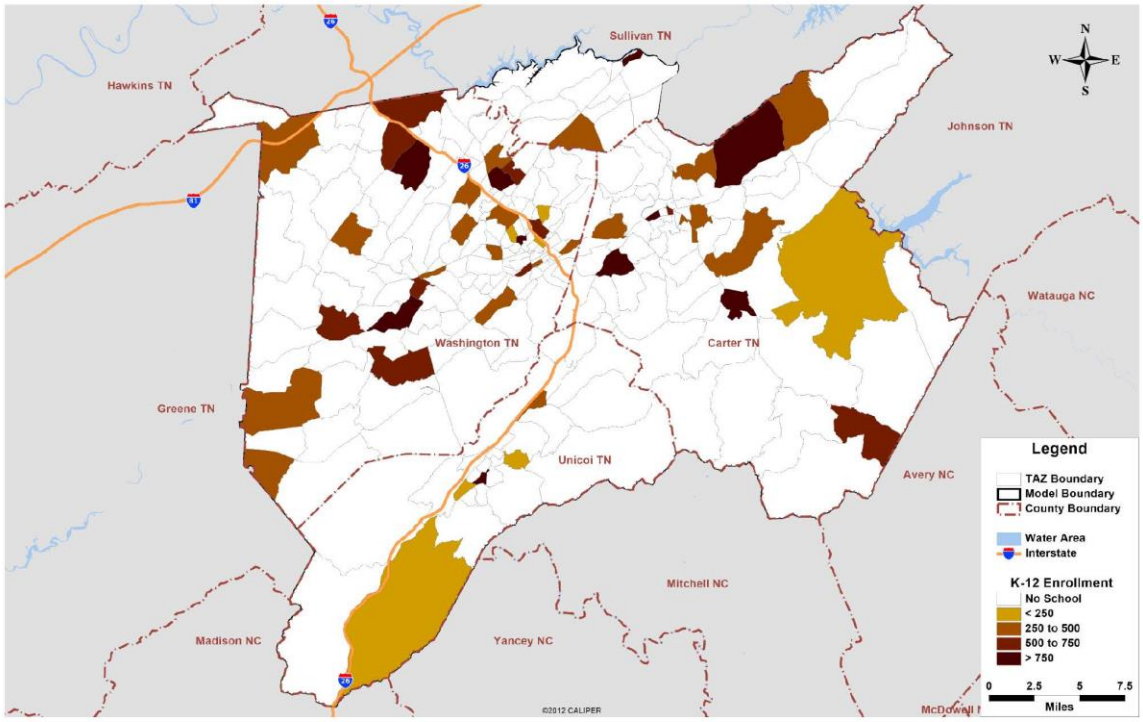


Figure 1-5 School Enrollment

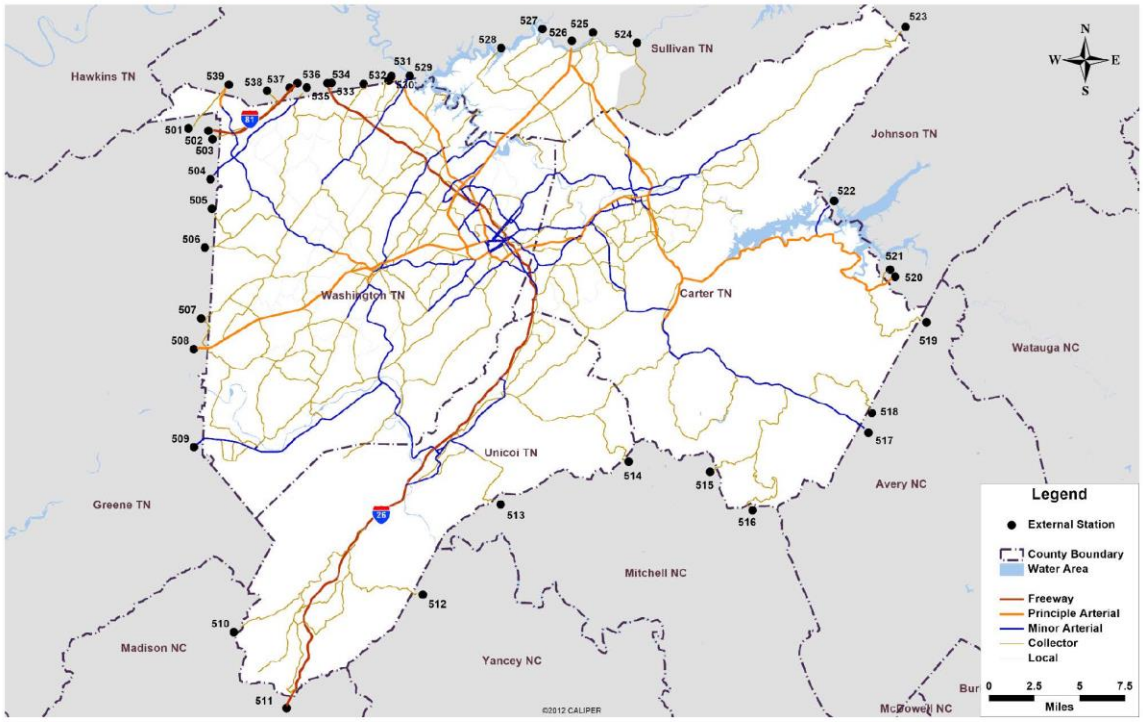


Figure 1-6 External Stations

2.0 HIGHWAY NETWORK DEVELOPMENT

To simulate travel within the Johnson City MTPO model area, the highway network was updated to represent the highway/street system. Development of the highway network involved identifying the network roads to be included, developing the TransCAD line network, collecting network attributes, and populating network data in TransCAD.

2.1 Master Network System

A single master network is used for the base year and all future year models. In TransCAD, the line layer is not the actual model network used by the travel demand modeling system. Rather, the model network is built from the line layer. This means the model network is developed as a selection set from the line layer. Having a selection set means that the base and future highway networks can use a different subset of the entire street network system.

An attribute named "In Network" in the line layer is used to identify the links to be included in the model's highway network building process. Active links in the base year network are identified by the "In Network" attributes in 2015. Any new highway to be constructed in a future year will be organized in the project lookup table. This lookup table will also include highway widening and other types of construction projects that have impact on highway capacity.

Using a master network and a project lookup table greatly simplifies the future year scenario management. The methodology related to future year projects and scenario management will be discussed in the next technical memorandum for future year model development.

2.2 Update the Highway Network

The highway network TransCAD line layer was developed using TDOT's TRIMS database and the existing 2009 model's line geography layer as a base. With the new study area boundary, all interstates, other freeways, arterials, and collector streets classified by TDOT are included in the model network. In addition, a significant portion of local roads were added to the model highway network for improved connectivity.

As a part of the network development process, corrections and quality checks were made to the TransCAD network, including verifying and correcting roadway alignments, eliminating fragmented or redundant links, and modifying disconnected intersection nodes.

Table 2-1 shows the roadway functional classification based on the Federal Highway Administration (FHWA) classification system. **Figure 2.1** shows the base year highway network links by functional classification.

2.3 Centroid Connectors

Centroid connectors are idealized links representing traffic loading points for the TAZs. Centroid connectors are often attached to the network at mid-block, and their placement should be consistent with land use and local road density. TransCAD requires at least one connector per TAZ. Often, two or more connectors are coded for some TAZs.

Centroid connectors are typically placed along lower functionally classified roads such as collectors and arterials. They also might connect to principal arterials if the arterial has numerous local crossroads and a considerable amount of abutting development. In cases where many local roads serve a large residential area, it might be appropriate to connect TAZ connectors to local roads, which would then be added into the network. TAZ connectors should not be attached to limited access roads or ramps.

For the Johnson City model, centroid connectors were developed using aerial photography to identify the most appropriate loading locations. These locations were further reviewed and refined to better reflect loading conditions during traffic assignment model calibration and validation process.

Internal and external zone centroid connectors were coded with functional classifications 99 and 98, respectively. Centroid connectors are coded with very high capacities since methodologically, it is the roadway network that is providing the capacity restraint while the centroid connector is merely acting as an access point.

All internal centroid connectors were assigned with a fixed travel speed of 25 mph. Speed limits at each external station were used for external centroid connectors connecting external stations to the model highway network.

Table 2-1 Roadway Functional Classification

Functional Classification ID	Category	Description
01	Rural	Interstate
02	Rural	Other Principle Arterial
03	Rural	Ramps
06	Rural	Minor Arterial
07	Rural	Major Collector
08	Rural	Minor Collector
09	Rural	Local
11	Urban	Interstate
12	Urban	Other Freeway and Expressway
13	Urban	Ramps
14	Urban	Other Principle Arterial
16	Urban	Minor Arterial
17	Urban	Major Collector
18	Urban	Minor Collector
19	Urban	Local
98	N/A	External Centriod Connector
99	N/A	Internal Centriod Connector

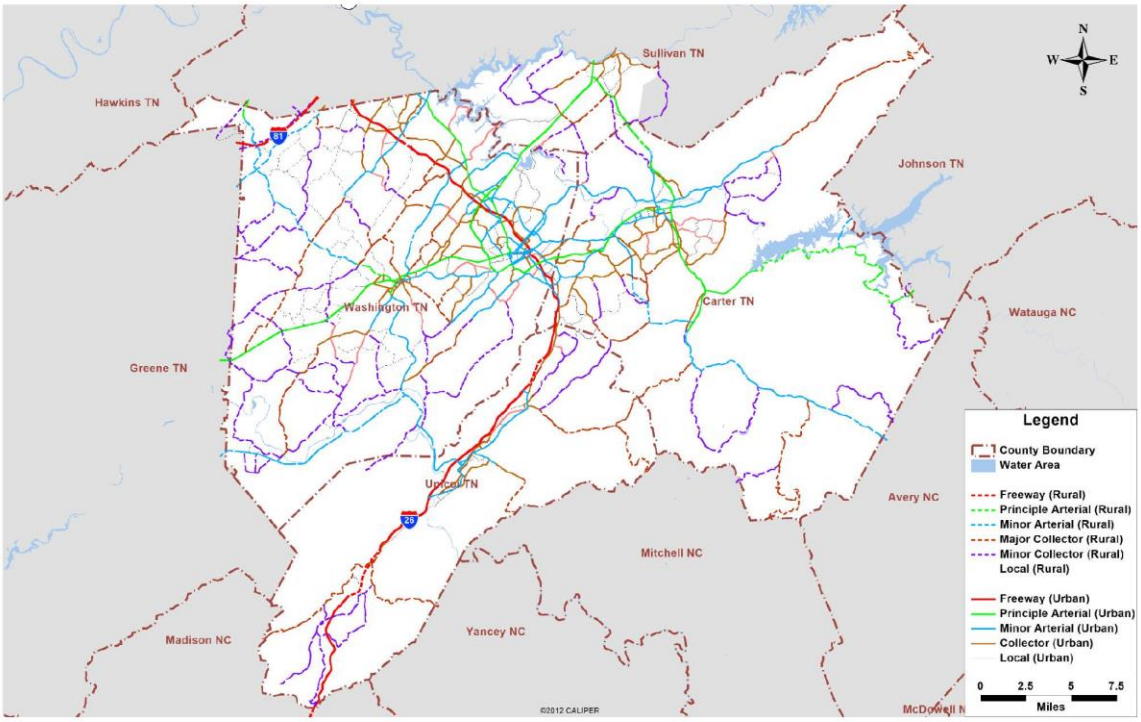


Figure 2-1 Johnson City Highway Network

2.4 Capacity Calculation

Using the collected base year link attributes, the roadway capacity in the Johnson City model is calculated using an equation which takes into account data such as functional classification, speed limit, lanes, median treatment, area type, average lane width, and average shoulder width. These equations are developed based on the Highway Capacity Manual (HCM) methodology. This method of capacity calculation has several benefits, including:

- Better representation of capacity based on roadway attributes
- Ability to load the model network with LOS D or E capacity
- Hourly capacities are calculated and utilized in the time-of-day model
- Ability to automatically recalculate capacities for future networks as improvements occur
- Ability to make adjustments to capacity equations throughout the process

The general form of the capacity equation is:

[2-1] $$SF = c \times N \times F_w \times F_{hv} \times F_p \times F_e \times F_d \times F_{sd} \times F_{sc} \times F_{clt} \times F_{park} \times (v/c)_i$$

Where:

$SF =$ Maximum service flow for desired level of service

$c =$ Capacity under ideal conditions (vehicles per hour per lane)

$N =$ Number of lanes

$F_w =$ Factor due to lane and shoulder width

$F_{hv} =$ Factor due to percent heavy vehicles

$F_p =$ Factor due to driver population

$F_e =$ Factor due to driving environment

$F_d =$ Factor due to directional distribution

$F_{sd} =$ Factor due to signal density

$F_{sc} =$ Factor due to signal coordination

$F_{clt} =$ Factor for continuous left turn lane (for undivided sections)

$F_{park} =$ Factor due to on − street parking

$(v/c)_i =$ Rate of service flow for levels of service D or E

The capacity equations **3-2** through **3-7** below represent the hourly link capacity calculation equations by roadway functional classification. All capacities are calculated by direction.

[2-2] Interstate/Freeway Capacity Equations (Functional classification = 1, 11, or 12)

$$SF = c \times N \times F_w \times F_{hv} \times F_p \times (v/c)_i$$

Where:

c = 2,200 (two lanes)
2,300 (three or more lanes)

N = Number of lanes, by direction

F_w =

Lane Width	Shoulder Width		
	0-1'	2-4'	5'+
Narrow (<=10')	0.78	0.83	0.88
Normal (>10')	0.90	0.95	1.00

F_{hv} = 0.88

F_p = 0.90 (Rural)
0.92 (Urban)

$(v/c)_i$ = 0.88 (LOS D)
1.00 (LOS E)

[2-3] Principal Arterial Capacity Equations (Functional classification = 2 or 14)

$$SF = c \times N \times F_w \times F_{hv} \times F_p \times F_e \times\times F_{sd} \times F_{sc} \times F_{clt} \times F_{park} \times (v/c)_i$$

Where:

c =

Median Type	Rural	Urban
Divided	1,700	1,500
Undivided	1,500	1,300

N = Number of lanes, by direction

F_w =

Median Type	Lane Width	Shoulder Width		
		0-1'	2-4'	5'+
Divided	Narrow (<=10')	0.78	0.83	0.88
	Normal (>10')	0.90	0.95	1.00
Undivided	Narrow (<=10')	0.78	0.82	0.86
	Normal (>10')	0.92	0.96	1.00

F_{hv} = 0.90

F_p = 0.95

F_e =

Median Type	Rural	Urban
Divided	1.0	0.9
Undivided	0.9	0.8

F_{sd} and F_{sc} =

Area Type	Suburban		Urban			CBD		
Signals / Mile	1-2	3+	1-2	3-4	5+	<7	7-9	10+
F_{sd}	1.00	0.85	1.10	1.00	0.95	1.00	0.90	0.80
F_{sc}	1.05	1.15	1.10	1.15	1.20	1.10	1.15	1.20

F_{clt} = 1.08 (for sections with continuous left turn lane)

F_{park} = 0.95 (for sections with on – street parking)

$(v/c)_i$ = 0.84 (LOS D)
1.00 (LOS E)

[2-4] Minor Arterial Capacity Equations (Functional classification = 6 or 16)

$$SF = c \times N \times F_w \times F_{hv} \times F_p \times F_e \times F_{sd} \times F_{sc} \times F_{clt} \times F_{park} \times (v/c)_i$$

Where:

c =

Median Type	Rural	Urban
Divided	1,600	1,400
Undivided	1,350	1,150

N = Number of lanes, by direction

F_w =

Median Type	Lane Width	Shoulder Width		
		0-1'	2-4'	5'+
Divided	Narrow (<=9')	0.77	0.83	0.88
	Normal (>9')	0.89	0.95	1.00
Undivided	Narrow (<=9')	0.81	0.86	0.93
	Normal (>9')	0.94	1.00	1.05

F_{hv} = 0.90

F_p = 0.98

F_e =

Median Type	Rural	Urban
Divided	1.0	0.9
Undivided	0.9	0.8

F_{sd} and F_{sc} =

Area Type	Suburban		Urban			CBD		
Signals / Mile	1-2	3+	1-2	3-4	5+	<7	7-9	10+
F_{sd}	1.00	0.85	1.10	1.00	0.90	1.05	1.00	0.95
F_{sc}	1.05	1.10	1.05	1.10	1.15	1.05	1.10	1.15

F_{clt} = 1.08 (for sections with continuous left turn lane)

F_{park} = 0.95 (for sections with on – street parking)

$(v/c)_i$ = 0.84 (LOS D)
1.00 (LOS E)

[2-5] Collector Road Capacity Equations (Functional classification = 7, 8, or 17)

$$SF = c \times N \times F_w \times F_{hv} \times F_e \times F_{sd} \times F_{sc} \times F_{clt} \times F_{park} \times (v/c)_i$$

Where:

c =

Median Type	Rural	Urban
Divided	1,350	1,150
Undivided	1,150	950

N = Number of lanes, by direction

F_w =

Median Type	Lane Width	Shoulder Width		
		0-1'	2-4'	5'+
Divided	Narrow (<=9')	0.81	0.86	0.93
	Normal (>9')	0.94	1.00	1.05
Undivided	Narrow (<=9')	0.81	0.85	0.90
	Normal (>9')	0.96	1.00	1.04

F_{hv} = 0.92

F_e =

Median Type	Rural	Urban
Divided	1.0	0.9
Undivided	0.9	0.8

F_{sd} and F_{sc} =

Area Type	Suburban		Urban			CBD		
Signals / Mile	1-2	3+	1-2	3-4	5+	<7	7-9	10+
F_{sd}	1.00	0.85	1.10	1.00	0.90	1.00	0.90	0.75
F_{sc}	1.05	1.10	1.05	1.05	1.10	1.05	1.05	1.10

F_{clt} = 1.08 (for sections with continuous left turn lane)

F_{park} = 0.95 (for sections with on – street parking)

$(v/c)_i$ = 0.83 (LOS D)
1.00 (LOS E)

[2-6] Ramp Capacity Equations (Functional classification = 3 or 13)

$$SF = c \times N \times (v/c)_i$$

Where:

c =

Ramp Type	c
Rural Ramp	1,200
Urban Ramp	1,100

N = Number of lanes, by direction

$(v/c)_i$ = 0.88 (LOS D)
1.00 (LOS E)

[2-7] Local Road Capacity Equations (Functional classification = 9 or 19)

$$SF = c \times N \times F_w \times F_{hv} \times F_e \times F_d \times F_{sd} \times F_{sc} \times F_{clt} \times F_{park} \times (v/c)_i$$

Where:

c =

Travel Lanes (by Direction)	Rural	Urban
Two-lane	900	800
Multi-lane	1,000	900

N = Number of lanes, by direction

F_w =

Travel Lanes (by Direction)	Lane Width	Shoulder Width		
		0-1'	2-4'	5'+
Two-lane	Narrow (<=9')	0.65	0.78	0.92
	Normal (>9')	0.85	1.00	1.10
Multi-lane	Narrow (<=9')	0.81	0.85	0.90
	Normal (>9')	0.96	1.00	1.04

F_{hv} = 0.97

F_e = 0.9 (Rural)
0.8 (Urban)

F_d =

Travel Lanes (by Direction)	Divided	Undivided
Two-lane	0.94	0.94
Multi-lane	1.16	1.00

F_{sd} and F_{sc} =

Area Type	Suburban		Urban			CBD		
Signals / Mile	1-2	3+	1-2	3-4	5+	<7	7-9	10+
F_{sd}	1.00	0.85	1.10	1.00	0.90	1.00	0.90	0.75
F_{sc}	1.05	1.10	1.05	1.05	1.10	1.05	1.05	1.10

F_{clt} = 1.08 (for sections with continuous left turn lane)

F_{park} = 0.95 (for sections with on − street parking)

$(v/c)_i$ = 0.83 (LOS D)
1.00 (LOS E)

3.0 INTERNAL TRIP GENERATION MODELS

Internal trip generation models were developed for the following six trip purposes:

- Home-based work (HBW),
- Home-based school (HBSC),
- Home-based shopping (HBSP),
- Home-based social-recreational (HBSR),
- Home-based other (HBO), and
- Non-home based (NHB).

3.1 Internal Person Trip Productions

Two-dimensional cross-classification trip production models were developed for each internal trip purpose. Production rates were developed using the National Household Travel Survey (NHTS) 2009 add-on data from TDOT and VDOT.

Trip production rates were estimated using a subset of the NHTS 2009 add-on data for sample households located in Metropolitan Statistic Areas (MSA) in Tennessee and Virginia that have population of less than 500,000. These MSAs are:

- Kingsport -Bristol-Johnson City, TN-VA
- Jackson, TN
- Clarksville-Hopkinsville, TN-KY
- Chattanooga, TN-GA
- Danville, VA
- Roanoke, VA
- Lynchburg, VA
- Charlottesville, VA

A total of 3,135 household samples are included in the subset, with 319 households in Tennessee and 2,816 households in Virginia.

The following cross-classification categories are used:

- By vehicle availability – Zero, one, and two plus vehicles per household
- By children – Zero, one, two, and three plus school-aged children per household
- By worker – Zero, one, two, and three plus workers per household
- By household size – One, two, three, and four plus persons per household

The two-dimensional cross classification production models are as follows:

- HBW - By vehicle availability, then by number of workers
- HBSC - By household size, then by number of school aged children
- HBSP - By Vehicle availability, then by household size
- HBSR - By Vehicle availability, then by household size
- HBO - By Vehicle availability, then by household size
- NHB - By Vehicle availability, then by household size

The household cross-classification distribution was obtained from the Census Transportation Planning Package

(CTPP) 2010 data set. The total number of households in each TAZ from Census 2010 was distributed to each cross-classification bin by applying the distributions from the CTPP data.

Trip Production Rates

Table 3-1 through **Table 3-6** show the trip production rates for each trip purpose.

Table 3-1 Trip Production Rates for Home-based Work (HBW) Trips

Workers	Vehicles				Weighted Average
	0	1	2	3+	
0	-	-	-	-	**-**
1	0.701	1.173	1.500	1.598	**1.446**
2	2.315			2.630	**2.467**
3+	4.053			5.229	**5.079**
Weighted Average	**0.079**	**0.459**	**1.436**	**1.978**	**1.261**

Table 3-2 Trip Production Rates for Home-based School (HBSC) Trips

Persons	Children			Weighted Average
	0	1	2+	
1	0.002	-	-	**0.002**
2	0.040	0.772	-	**0.094**
3	0.869	1.238	1.599	**1.133**
4+		2.252	2.642	**2.422**
Weighted Average	**0.118**	**1.325**	**2.605**	**0.661**

Table 3-3 Trip Production Rates for Home-based Shopping (HBSP) Trips

Persons	Vehicles				Weighted Average
	0	1	2	3+	
1	0.293	0.813			**0.704**
2	1.481		1.514	1.589	**1.531**
3+	2.006			2.946	**2.456**
Weighted Average	**0.656**	**1.474**	**1.399**	**2.315**	**1.648**

Table 3-4 Trip Production Rates for Home-based Social-Recreational (HBSR) Trips

Persons	Vehicles				Weighted Average
	0	1	2	3+	
1	0.132	0.380			**0.328**
2	0.706				**0.706**
3	0.616		1.263	1.810	**1.399**
4+	1.046		1.891	3.711	**2.740**
Weighted Average	**0.356**	**0.528**	**1.004**	**1.844**	**1.093**

Table 3-5 Trip Production Rates for Home-based Other (HBO) Trips

Persons	Vehicles				Weighted Average
	0	1	2	3+	
1	0.097	0.389	0.417	0.792	**0.345**
2	1.093				**1.093**
3	0.903		1.301		**1.227**
4+	1.032		3.338		**3.224**
Weighted Average	**0.534**	**0.762**	**1.608**	**1.590**	**1.315**

Table 3-6 Trip Production Rates for Non-Home Based (NHB) Trips

Persons	Vehicles				Weighted Average
	0	1	2	3+	
1	0.138	1.125	1.144		**0.921**
2	2.480			2.730	**2.558**
3	4.628			4.798	**4.707**
4+	4.093		4.108	6.003	**5.034**
Weighted Average	**0.762**	**2.586**	**2.620**	**4.160**	**2.958**

Model Application and Validation Checks

The trip production models were applied using the year 2015 demographic data. **Table 4-7** compares the aggregate person trip rates per TAZ, person, households, and employee with these contained in the TN Guidelines. Values for person trips per TAZ, person trips per household, and HBW trips per employee are within the range of values described in the TN Guidelines. The value of 4.2 trips per person is high in comparison to the TN Guidelines.

Table 3-7 Aggregate Trip Rates

Statistics	Johnson City Model	TN Guidelines	
		Low	High
Person Trips/TAZ	3,182	N/A	15,000
Person Trips/Person	4.0	3.3	4.0
Person Trips/HH	8.6	8.0	10.0
HBW Trips/Employee	1.43	1.20	1.55

Table 3-8 compares the person trip rates per household with the latest Chattanooga and Knoxville household travel surveys. Except for HBSR trips, the average trip rates per household are generally consistent with other surveys.

Table 3-8 Trip Production Rates (Person Trips / HH) by Trip Purpose

Trip Purpose	Johnson City Model (NHTS 2009 MSA<500K, TN/VA combined, 3,135 samples)	NHTS 2009 MSA<500K TN Only (319 samples)	NHTS 2009 MSA<500K VA Only (2,816 samples)	Chattanooga Survey	Knoxville Survey
HBW	1.26	1.23	1.30	1.19	1.24
HBSC	0.66	0.75	0.55	0.75	0.77
HBSP	1.65	1.73	1.55	1.57	1.04
HBSR	1.09	0.98	1.24	0.53	0.62
HBO	1.32	1.30	1.34	1.46	1.38
NHB	2.96	3.11	2.77	2.74	2.47
Total	**8.94**	**9.10**	**8.73**	**8.98**	**7.50**

Table 3-9 shows the percent of trips by trip purpose after applying the trip production models, and compares these with the values from the TN Guidelines and other household surveys. The results show general consistency with other surveys and fit within the range described in the TN Guidelines.

Table 3-9 Percent Trips by Trip Purpose Compared

Trip Purpose	Johnson City Model (NHTS 2009 MSA<500K TN/VA Combined)	TN Guidelines	Chattanooga 2010 Survey	Knoxville 2001/2008 Survey
HBW	15.2%	12% - 24%	14.4%	16.5%
HBSC	7.3%	5% - 8%	9.1%	10.2%
HBSP	18.4%	10% - 20%	19.1%	13.9%
HBSR	11.8%	9% - 12%	6.5%	8.2%
HBO	14.3%	14% - 28%	17.7%	18.4%
NHB	32.9%	20% - 33%	33.2%	32.9%
Total	**100%**	**100%**	**100%**	**100%**

3.2 Internal Person Trip Attractions

Trip attraction models were borrowed from the Chattanooga Model for the six internal trip purposes. A description of the model structure and rates is provided below.

Model Structure

Attraction models borrowed from Chattanooga were developed from the Chattanooga household survey data. All models are ordinary least squares regressions with no intercept and are of the following general form:

$$A_i = \sum_j c_j \times E_j$$

Where:

A_i = Trip Attractions for trip purpose i
c_j = Coefficient for independent variable j
E_j = Value of independent variable j

The independent variables include:

- Total Employment,
- Total Household,
- K-12 School Enrollment,
- College Enrollment, and
- One of the employment categories: Agriculture, Manufacturing, Retail, Office, Service, and Government.

Table 3-10 through **Table 3-15** show the trip production models for each trip purpose.

Table 3-10 Trip Attraction Rates for Home-based Work (HBW) Trips

Variable	Coefficient
Total Employment	0.953

Table 3-11 Trip Attraction Model for Home-based School (HBSC) Trips

Variable	Coefficient
K-12 School Enrollment	1.657
College Enrollment	0.557

Table 3-12 Trip Attraction Model for Home-based Shopping (HBSP) Trips

Variable	Coefficient
Retail	9.673

Table 3-13 Trip Attraction Model for Home-based Social-Recreational (HBSR) Trips

Variable	Coefficient
Retail	1.241
Service	0.263
Total Households	0.251

Table 3-14 Trip Attraction Model for Home-based Other (HBO) Trips

Variable	Coefficient
K-12 School Enrollment	1.700
Retail	1.155
Service	0.996
Total Households	0.177

Table 3-15 Trip Attraction Model for Non-home Based (NHB) Trips

Variable	Coefficient
Retail	8.348
Service	1.696
Total Households	0.906

3.3 Internal Person Trip Balancing

After applying the production and attraction models using the year 2015 demographic and employment data, the resulting total number of productions and attractions for each trip purpose are shown in **Table 3-16.**

Table 3-16 Trip Production and Attraction Totals, Year 2010

Trip Purpose	Productions	Attractions	% Difference
HBW	130,429	86,917	-33.4%
HBSC	62,545	56,623	-9.5%
HBSP	157,213	123,920	-21.2%
HBSR	101,229	50,791	-49.8%
HBO	122,713	119,783	-2.4%
NHB	281,784	260,934	-7.4%
Total	**855,913**	**698,968**	**-18.3%**

For NHB trips, the attraction vector is first scaled to the total productions. Then the production vector is set to equal the attraction vector because NHB trips are not produced from home zones. Unbalanced productions and attractions for other trip purposes are simply balanced to the production end.

4.0 TIME OF DAY MODEL

Four time-of-day periods are incorporated into the model stream from the trip distribution to assignment steps. The four time-of-day periods are AM peak, Midday, PM peak, and off-peak. Development of the time-of-day model included identifying peak travel time periods, developing peak period factors, and developing the percentage of trips by purpose during each time period by direction. Time-of-day factors were used to reflect peak period traffic behavior. Factors also are used for external station trips to convert the daily vehicle flows into traffic by direction by time period.

4.1 Determination of Peak Hour Periods

The peak hour periods were determined from the travel characteristics exhibited in the NHTS 2009 Household Travel Survey using samples from MSAs with population less than 500,000. Although different trip purposes have different peaking characteristics, the peak hour periods were determined based on peaking characteristics of internal auto trips since they were the majority of the trips using the highway facility.

For this time-of-day analysis, the trip summaries are based on the midpoint time of each trip. Although trips can be reviewed at the half-hour increment, traffic count data is only available consistently in hourly increments throughout the region. The peak periods selected would need to be in hourly increments in order for the assignment results to be validated using traffic counts. **Figure 4-1** shows a graphical display of the trip peaking characteristics by purpose. **Table 4-1** shows the distribution of the internal auto trips by hour for each trip purpose.

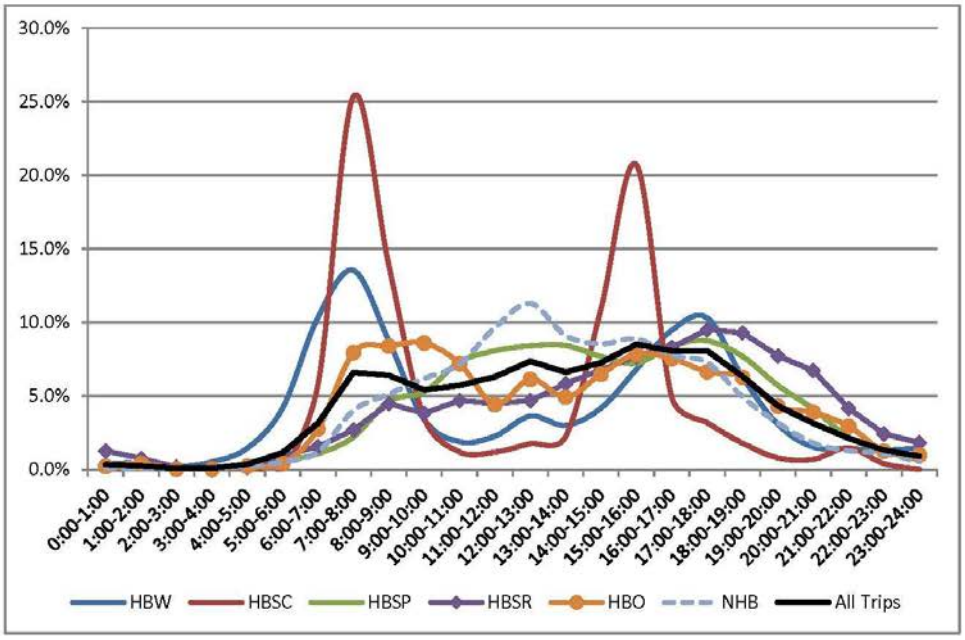


Figure 4-1 Auto Trips by Purpose by Time of Day

Table 4-1 Auto Trips by Purpose by Time of Day

Time Period	Percent of Trips by Purpose						All Purposes
	HBW	HBSC	HBSP	HBSR	HBO	NHB	
0:00-1:00	0.4%	0.0%	0.2%	1.3%	0.2%	0.1%	0.4%
1:00-2:00	0.4%	0.0%	0.0%	0.8%	0.4%	0.0%	0.2%
2:00-3:00	0.2%	0.0%	0.0%	0.2%	0.0%	0.0%	0.1%
3:00-4:00	0.5%	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%
4:00-5:00	1.5%	0.0%	0.0%	0.1%	0.2%	0.2%	0.4%
5:00-6:00	4.2%	0.1%	0.6%	0.9%	0.4%	0.5%	1.1%
6:00-7:00	10.4%	5.8%	1.1%	1.6%	2.8%	1.2%	3.1%
7:00-8:00	13.5%	25.3%	2.2%	2.7%	7.9%	4.0%	6.6%
8:00-9:00	8.8%	13.9%	4.6%	4.5%	8.4%	5.1%	6.4%
9:00-10:00	3.4%	3.5%	5.3%	3.8%	8.6%	6.2%	5.4%
10:00-11:00	1.9%	1.2%	7.3%	4.7%	7.2%	7.2%	5.7%
11:00-12:00	2.3%	1.2%	8.1%	4.5%	4.4%	9.7%	6.3%
12:00-13:00	3.6%	1.8%	8.4%	4.7%	6.1%	11.3%	7.4%
13:00-14:00	3.0%	2.2%	8.4%	5.8%	4.9%	9.1%	6.6%
14:00-15:00	4.2%	10.9%	7.7%	6.8%	6.5%	8.5%	7.3%
15:00-16:00	6.8%	20.7%	7.2%	7.7%	7.8%	8.9%	8.5%
16:00-17:00	9.5%	4.9%	8.4%	8.3%	7.5%	7.8%	8.1%
17:00-18:00	10.3%	3.2%	8.7%	9.5%	6.7%	7.3%	8.1%
18:00-19:00	6.3%	1.8%	7.7%	9.3%	6.3%	4.9%	6.3%
19:00-20:00	3.1%	0.8%	5.7%	7.7%	4.3%	3.2%	4.3%
20:00-21:00	1.5%	0.7%	4.1%	6.7%	3.9%	1.8%	3.1%
21:00-22:00	1.4%	1.5%	2.2%	4.2%	2.9%	1.3%	2.1%
22:00-23:00	1.3%	0.4%	1.3%	2.4%	1.3%	1.1%	1.3%
23:00-24:00	1.5%	0.0%	0.6%	1.8%	1.0%	0.5%	0.9%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table 4-1 and **Figure 4-1** illustrate that the AM peak has a more pronounced, shorter peak, while the PM peak is spread over a longer time period. Home-based work and school trips exhibit significant peaking at both AM and PM peak hours. For other trip purposes, most trips occur in the Midday and PM periods.

Criteria used for selecting the peak periods in the Johnson City model include:

- Approximately 15% – 35% of the total daily trips should occur in each peak period
- Peak periods should capture the significant peak hours for HBW and HBSC trips
- Selected peak periods should allow for the capturing of peak spreading in the future, since the same time-of-day factors will be applied to the base year and future years
- Selected time-of-day periods are consistent with TDOT statewide model and TN Guildlines.

Based on the criteria above, 6 to 9 AM was selected for AM peak period, and 3 to 6 PM was selected for PM peak period. The AM and PM peak periods account for 16% and 25% of the daily auto trips, respectively. The midday period lasts from 9 AM to 3 PM. The night off-peak period lasts from 6 PM to 6 AM. Time range for each period is shown in **Table 4-2.**

Table 4-2 Time of Day Period Definition

Time Period	Time Range	Period Length	% Auto Trips (NHTS 2009 Survey)
AM Peak	6 AM - 9 AM	3 Hours	16.2%
Midday Off-peak	9 AM - 3 PM	6 Hours	38.7%
PM Peak	3 PM - 6 PM	3 Hours	24.7%
Night Off-peak	6 PM - 6 AM	12 Hours	20.5%

4.2 Model Application

The Johnson City Model applies time-of-day factors at multiple points in the process. For internal person trips, time-of-day factors are applied after trip generation to divide the trips by purpose into productions and attractions by time period. After the mode split step, a second set of directional factors are applied to convert the distributed productions and attractions into origins and destinations. Since the directionality of trips vary by time period, these factors are applied by each time period and trip purpose.

The process is similar for external trips (auto and truck) except that trips are already vehicular and do not have a mode-split component. **Figure 4-2** illustrates the time-of-day modeling process used in the Johnson City Model.

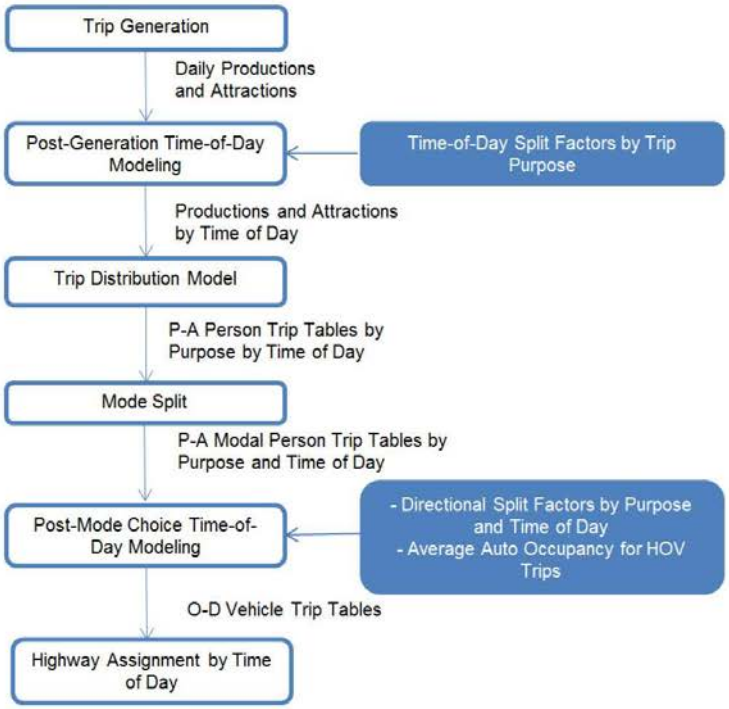


Figure 4-2 Time-of-day Model Application

4.3 Internal Person Trip Time-of-Day Factors

Internal person trip factors were developed for six trip purposes and four time periods based on the household travel survey.

Post-Trip Generation Trip Factors

Post-trip generation factors were applied after the trip generation step to split the daily productions and attractions into four time-of-day periods. **Table 4-3** shows the trip split factors for internal person trips. The initial values of these factors were calculated using the NHTS 2009 household survey. The final values were adjusted based on the assignment results compared with observed traffic counts.

Table 4-3 shows that 28% of the HBW trips occur in the AM peak period, and 27% occur in the PM peak since most people are going to and coming back from work in these times. HBSC trips exhibit similar behavior as HBW trips, but a higher percentage of these trips occur during the AM and PM peaks. HBSP, HBSR, and HBO trips are more spread out during MD, PM, and Off-peak periods, while most Non-Home Based trips occur during the midday and PM periods.

Table 4-3 Time-of-day Internal Person Trip Factor (Post-Trip Generation)

Trip Purpose	AM	MD	PM	OP	Daily
HBW	28.1%	19.9%	27.3%	24.7%	100.0%
HBSC	40.9%	21.5%	30.7%	6.9%	100.0%
HBSP	5.7%	44.1%	24.6%	25.7%	100.0%
HBSR	6.4%	30.4%	25.8%	37.4%	100.0%
HBO	16.1%	39.7%	21.9%	22.4%	100.0%
NHB	7.4%	52.1%	25.1%	15.4%	100.0%
Total	13.8%	39.2%	25.4%	21.7%	100.0%

Post-Mode Choice Trip Factors

Post-mode choice factors are trip directionality factors that are applied after the mode split step to separate the trips into departure and return trips. These factors are also derived from the NHTS 2009 household travel survey and shown in **Table 4-4**. Non-Home Based trips do not apply a directional factor since they do not have the home as an origin or destination point. NHB trips are distributed equally in both directions.

Table 4-4 Time-of-day Directional Trip Factors (Post-Mode Choice)

Trip Purpose	AM		MD		PM		OP	
	Departure	Return	Departure	Return	Departure	Return	Departure	Return
HBW	98.75%	1.25%	61.16%	38.84%	11.33%	88.67%	31.84%	68.16%
HBSC	98.16%	1.84%	28.38%	71.62%	10.96%	89.04%	29.21%	70.79%
HBSP	74.68%	25.32%	49.02%	50.98%	38.11%	61.89%	33.91%	66.09%
HBSR	74.34%	25.66%	61.46%	38.54%	50.04%	49.96%	35.51%	64.49%
HBO	80.55%	19.45%	59.11%	40.89%	42.49%	57.51%	33.28%	66.72%
NHB	50.00%	50.00%	50.00%	50.00%	50.00%	50.00%	50.00%	50.00%
Total	**81.59%**	**18.41%**	**52.47%**	**47.53%**	**39.15%**	**60.85%**	**37.39%**	**62.61%**

After the mode choice model, the modal-person trip tables are still in production-attraction format. The directional factors in **Table 5-4** are applied to the trip tables to split the trips into departure and return trips by time-of-day period. For example, 100 home-based work trips choosing bus travel mode are produced from TAZ 101 and are attracted to TAZ 201 in the AM period. By applying the post-mode choice factors in **Table 5-4**, 99 of the 100 trips are departing from home to work, and only 1 of the 100 trips are returning from work to home. After applying the directional split factors, the resulting trip tables will be in origin-destination format and are ready to be assigned to the highway network.

5.0 INTERNAL TRIP DISTRIBUTION MODEL

Trip distribution, the second step in the traditional four-step modeling process, matches person trip ends (trip productions and trip attractions) estimated in the trip generation process to produce production-attraction person trip tables by purpose. To complete this process, trip distribution attempts to account for differences in attractiveness and accessibility of each possible zone-to-zone interchange in the model, reflecting each zone's land use and roadway network characteristics. The Johnson City model uses the most common type of trip distribution model, the gravity model, for all internal trip purposes. Trip distribution models were developed for the following six internal trip purposes:

- Home-Based Work (HBW)
- Home-Based School (HBSC)
- Home-Based Shopping (HBSP)
- Home-Based Social-Recreational (HBSR)
- Home-Based Other (HBO)
- Non Home-Based (NHB)

This section describes the gravity trip distribution model structure, its parameters, and the validation results.

5.1 Gravity Trip Distribution Model Structure

The gravity model formulation can be expressed as the equation below:

$$T_{i,j} = \frac{P_i \times A_j \times F_{i,j} \times K_{i,j}}{\sum_{j' \in Zones} A_{j'} \times F_{i,j'} \times K_{i,j'}}$$

where:

$T_{i,j}$	=	trips produced in zone i and attracted to zone j
P_i	=	total trips produced by zone i
A_j	=	total trips attracted by zone j
$F_{i,j}$	=	friction factor (function of impedance) between zones i and j
$K_{i,j}$	=	trip adjustment (K) factor between zones i and j

The gravity trip distribution model requires that friction factors and K-factors are estimated in a manner that matches the observed trip length frequency distribution and travel patterns as reflected in the household travel surveys. For the Johnson City model, the trip length distribution and travel pattern were derived from the CTPP 2010 Part 3 data for HBW trips only. Other internal trip purposes were then compared to the HBW average trip length and frequency distribution and were validated based on available guidelines.

Travel Impedances

In most urban areas with no significant transit services, travel impedance is based solely on highway travel time. Because the Johnson City model forecasts travel by four time-of-day periods, the travel impedances for distribution are based on congested travel times for each time-of-day period. The initial congested travel times in the Johnson City model are estimated by adjusting the posted speed limit with a congested speed adjustment factor for each time-of-day period. Due to very limited traffic counts with speed data in Johnson City, the adjustment factors were mainly borrowed from the Bristol MPO model that was developed from field measured speed data. The adjustment factors are presented in **Table 5-1** below.

Table 5-1 Congested Speed Adjustment Factors by Time-of-day

Time-of-day Period	Functional Classification	Area Type			
		CBD	Urban	Suburban	Rural
AM	Freeway	0.90	0.91	0.95	1.00
	Major Arterial (Posted Speed >= 45 mph)	0.90	0.95	0.97	1.00
	Major Arterial (Posted Speed < 45 mph)	0.98	1.00	1.00	1.00
	Minor Arterial (Posted Speed >= 45 mph)	0.90	0.95	0.97	1.00
	Minor Arterial (Posted Speed < 45 mph)	0.98	1.00	1.00	1.00
	Collector	0.80	0.85	0.90	0.98
	Local	0.70	1.00	1.00	1.00
MD	Freeway	0.90	0.90	0.95	1.00
	Major Arterial (Posted Speed >= 45 mph)	0.88	0.88	0.92	0.97
	Major Arterial (Posted Speed < 45 mph)	0.98	1.00	1.00	1.00
	Minor Arterial (Posted Speed >= 45 mph)	0.88	0.88	0.92	0.97
	Minor Arterial (Posted Speed < 45 mph)	0.98	1.00	1.00	1.00
	Collector	0.75	0.83	0.88	0.93
	Local	0.70	1.00	1.00	1.00
PM	Freeway	0.90	0.90	0.95	1.00
	Major Arterial (Posted Speed >= 45 mph)	0.88	0.88	0.93	0.98
	Major Arterial (Posted Speed < 45 mph)	0.92	0.95	1.00	1.00
	Minor Arterial (Posted Speed >= 45 mph)	0.88	0.88	0.93	0.98
	Minor Arterial (Posted Speed < 45 mph)	0.92	0.95	1.00	1.00
	Collector	0.80	0.83	0.89	0.95
	Local	0.70	1.00	1.00	1.00
OP	Freeway	1.00	1.02	1.03	1.05
	Major Arterial (Posted Speed >= 45 mph)	1.00	1.12	1.15	1.15
	Major Arterial (Posted Speed < 45 mph)	0.98	1.10	1.10	1.12
	Minor Arterial (Posted Speed >= 45 mph)	1.00	1.12	1.15	1.15
	Minor Arterial (Posted Speed < 45 mph)	0.98	1.10	1.10	1.12
	Collector	0.95	1.05	1.05	1.10
	Local	0.95	1.00	1.00	1.00

Feedback loops are implemented in the Johnson City Model. The initial congested travel times are input to provide a starting point for the model feedback loops to converge faster. At the end of each feedback iteration, congested travel time using the Method of Successive Averages (MSA) estimated by the model after traffic assignment are used to estimate travel impedances for the next iteration.

Intrazonal Travel Time

Intrazonal travel time refers to the average travel time for a trip that begins and ends at the same TAZ. Because the model network does not assign trips that are made within the same zone, intrazonal travel times cannot be computed by the network skimming process, and must be added separately to the skim matrix. For the Johnson City Model, the intrazonal travel time is calculated as half the average travel time to the four closest neighboring zones.

Terminal Time

Terminal time is the time associated with a person entering or exiting the modeled transportation network. Using a home-based work trip as an example, at the origin end, terminal time is the time leaving home and entering the car. At the destination, terminal time is the time to park the car and enter the office building. Typically, terminal time is larger in areas with higher land use density, and is smaller in less denser areas. For the Johnson City model, the following terminal times are used based on the area type of the zones:

- CBD = 5 minutes
- Urban = 3 minutes
- Suburban = 2 minutes
- Rural = 1 minute

Friction Factors

In gravity models, friction factors are used to represent the impedance between zones. Friction factors are typically inversely proportional to trip length. The friction factors for the Johnson City model are entered into the TransCAD modeling process as a gamma function equation. Each trip purpose has a unique set of friction factors that were developed through an iterative process to replicate the average trip length and trip distribution profile of the target data. The benefit of the gamma function is that it produces a smooth, continuous trip distribution curve that can be calibrated using mathematical functions. The gamma function is described below:

$$F_{i,j} = \mathrm{a} \times t_{i,j}^{b} \times e^{c \times t_{i,j}}$$

Where:

$F_{i,j}$ = Friction factor from zone i to zone j

a , b, c = Gamma function coefficients

$t_{i,j}$ = Travel time, or impedance from zone i to zone j

e = Base of the natural logarithms

5.2 Gravity Model Parameters

For each internal trip purpose, gamma function parameters were adjusted in an iterative process to produce reasonable average trip lengths based on the target trip length distribution. For the Johnson City Model, trip length distribution and travel pattern for work trips were derived from the CTPP 2010 Part 3 data. Other internal trip purposes were compared to the HBW average trip length and frequency distribution and were validated based on TN Guidelines. **Table 5-2** shows the final calibrated gamma function parameters for each internal trip purpose.

Table 5-2 Calibrated Gamma Function Parameters (Internal Trips)

Internal Trip Purpose	Gamma Function Parameters	
	b	c
HBW	0.015	0.14
HBSC	1.28	0.175
HBSP	1.56	0.65
HBSR	0.15	0.19
HBO	0.4	0.15
NHB	0.7	0.11

5.3 Model Validation

Because there is no existing database that can provide an accurate picture of trip interchanges at the TAZ level, the following aggregate measures are used to validate the trip distribution models:

- Average trip length,
- Percentage of intrazonal trips,
- Trip length distribution, and
- Production-Attraction trip interchanges at the county level.

Average Trip Lengths

Although the CTPP 2010 Journey-to-work data included estimated travel times, the estimated values were only aggregated to five to ten minute intervals. To get better estimates of average trip lengths and the distribution of trip lengths, travel times were directly obtained from the model network based on the production/attraction zones in the CTPP trip table. Travel time statistics were then calculated for work trips. **Table 5-3** shows the comparison between the results of the calibrated trip distribution model and the CTPP data for mean travel times by trip purpose. The comparison shows a reasonable match between model results and observed trip lengths for work trips. Average times for all trip purposes are within ranges in TN Guidelines.

Table 5-3 Average Travel Times by Trip Purpose

Trip Purpose	Average Travel Time (minutes)		
	Observed (CTPP 2010)	Model Predicted	TN Guidelines
HBW	18.62	17.05	12 - 35
HBSC	-	13.07	7 - 16
HBSP	-	14.79	9 - 19
HBSR	-	14.43	11 - 19
HBO	-	14.86	8 - 20
NHB	-	14.05	6 - 19

Percentage of Intrazonal Trips

Another validation measure closely related to trip length distributions is the fraction of intrazonal trips. Intrazonal trips are made within the same zone and are not assigned to the model network. The percentage of intrazonal trips provides a measure for the amount of "very short" trips. **Table 5-4** shows the comparison between the calibrated trip distribution models, the CTPP data, and the TN Guidelines. Percent intrazonal trips for HBSP and NHB trips are slightly out of the range in TN Guidelines.

Table 5-4 Comparison of the Intrazonal Trip Percentage by Purpose

Trip Purpose	Percent Intrazonal Trips		
	Observed (CTPP 2010)	Model Predicted	TN Guidelines
HBW	3.5%	2.7%	1% - 4%
HBSC	-	10.1%	10% - 12%
HBSP	-	8.5%	3% - 9%
HBSR	-	7.6%	4% - 10%
HBO	-	6.4%	3% - 7%
NHB	-	8.6%	5% - 9%

Travel Time Frequency Distribution

The average trip length only provides the mean travel time. It is also very important to check the fraction of trips that are within a certain range of travel times. Using the CTPP 2010 data set, work trips can be grouped by travel time bins in one or two minute intervals, and a trip length distribution curve can be plotted. By comparing the trip length distribution curve from the model with the CTPP 2010 data, significant differences in travel time distribution can be revealed. Comparative plots for CTPP 2010 data and model predicted travel time frequency distribution curves for HBW trips are shown in **Figure 5-1.** No problems were indicated by this visual check.

The correlation between the observed and modeled trip length frequency tables for HBW trips is 97%. A correlation coefficient of 1.0 (100%) implies that the two frequency vectors are perfectly linearly correlated.

Another measure used to check the match of the distribution curves is the coincidence ratio. After overlaying the modeled and observed distribution curves, the coincidence ratio is calculated as the area under both curves divided by the area under at least one of the curves. It measures the percent of the area that "coincides" for the two curves. The coincidence ratio between the observed and predicted curves is 83.3%, which indicates a reasonable match.

Figure 5-2 through **Figure 5-6** show the travel time frequency distribution curves for other trip purposes.

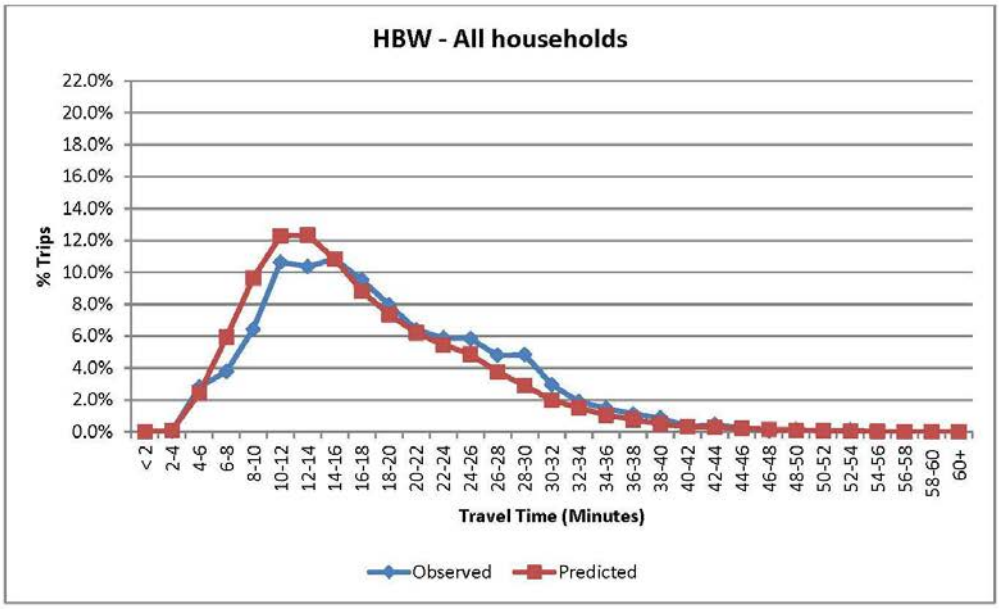


Figure 5-1 Observed and Predicted Trip Length Distribution for HBW Trips

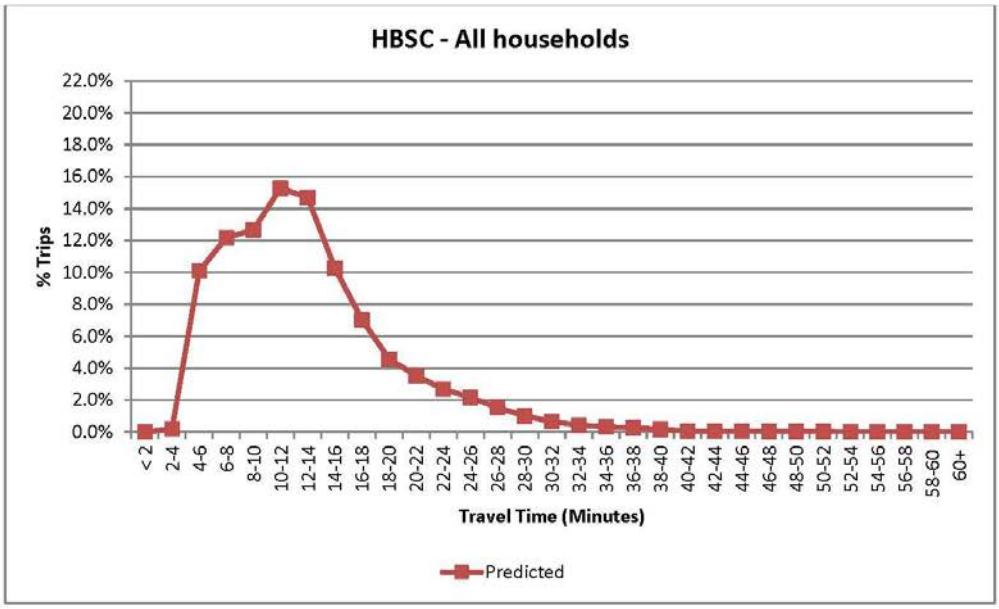


Figure 5-2 Predicted Trip Length Distribution for HBSC Trips

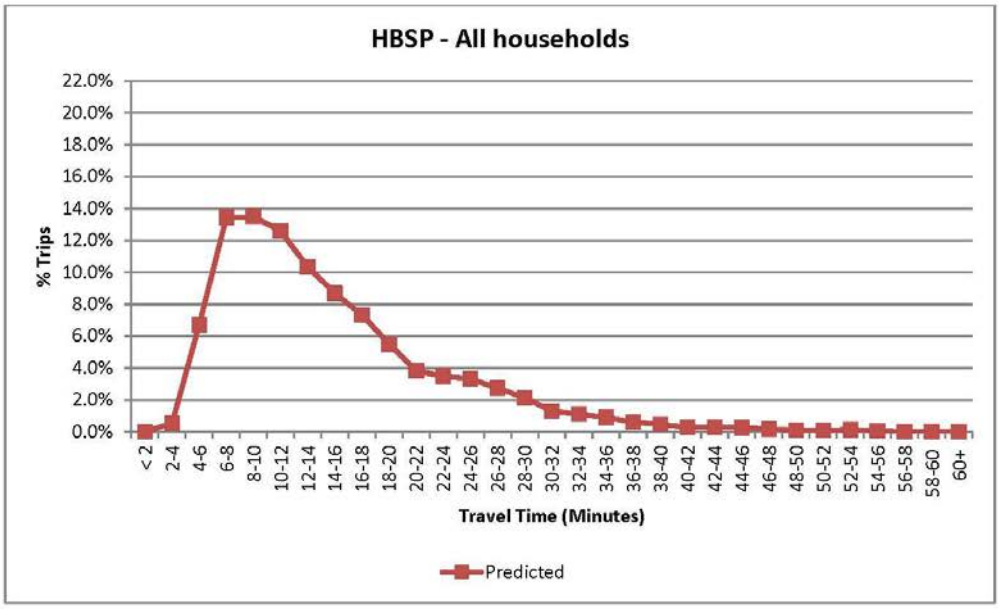


Figure 5-3 Predicted Trip Length Distribution for HBSP Trips

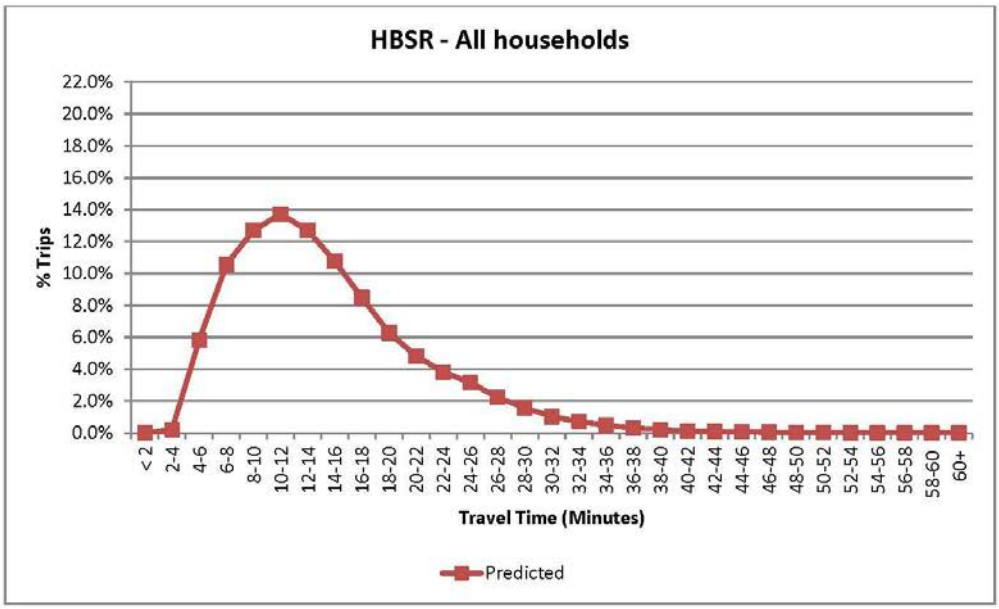


Figure 5-4 Predicted Trip Length Distribution for HBSR Trips

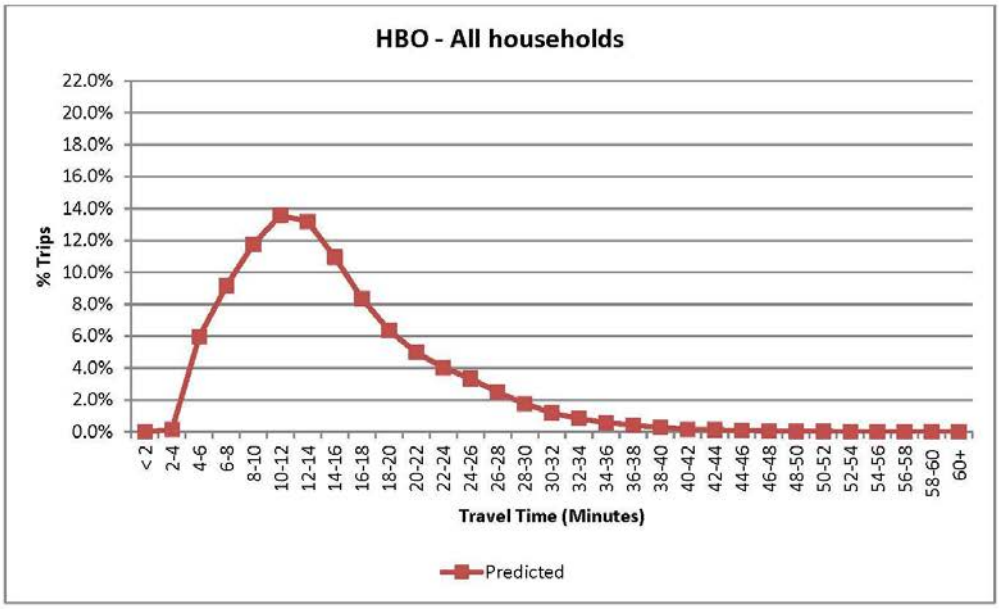


Figure 5-5 Predicted Trip Length Distribution for HBO Trips

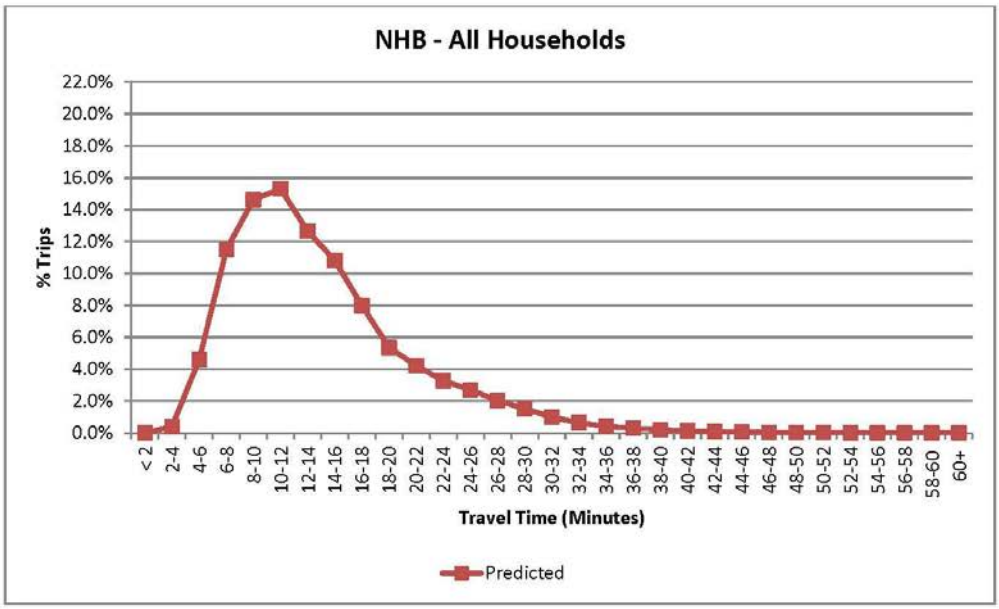


Figure 5-6 Predicted Trip Length Distribution for NHB Trips

Aggregate Trip Interchange Comparison at the County Level

The CTPP journey-to-work (JTW) trip interchanges aggregated at the county level are shown in **Table 5-5**. Total trips crossing the state line are approximately 3.5%.

Table 5-5 County to County Production-Attraction Interchanges (CTPP 2010 JTW)

Name	Carter	Sullivan	Unicoi	Washington	Total
Carter	14.4%	0.9%	0.0%	12.9%	28.2%
Sullivan	0.4%	1.0%	0.0%	2.2%	3.6%
Unicoi	0.3%	0.0%	2.4%	3.7%	6.4%
Washington	1.7%	0.8%	0.4%	59.0%	61.8%
Total	16.7%	2.7%	2.8%	77.7%	100.0%

The initial model predicted trip interchanges are shown in **Table 5-6**. The initial assignment results showed that the model over-estimated trips between Sullivan and Carter counties, and between Washington and Carter counties comparing with the CTPP data. Results from the model's traffic assignment also shows significantly more traffic going from Bristol to Elizabethton. To match the travel pattern exhibited in the CTPP 2010 data set, K factors that various from 0.3 to 2.0 were introduced to the gravity model. **Table 5-7** shows the aggregated trip interchanges after the K factor was introduced. Same K factors were applied to all trip purposes except school trips.

Table 5-6 County to County Production-Attraction Interchanges (Model Predicted, Before K Factor)

Name	Carter	Sullivan	Unicoi	Washington	Total
Carter	12.4%	1.7%	1.0%	11.4%	26.6%
Sullivan	0.5%	1.9%	0.0%	3.1%	5.5%
Unicoi	0.6%	0.1%	3.8%	3.8%	8.3%
Washington	1.7%	1.4%	1.5%	55.1%	59.7%
Total	15.2%	5.1%	6.3%	73.4%	100.0%

Table 5-7 County to County Production-Attraction Interchanges (Model Predicted, After K Factor)

Name	Carter	Sullivan	Unicoi	Washington	Total
Carter	13.5%	1.2%	0.7%	11.1%	26.6%
Sullivan	0.2%	2.8%	0.0%	2.5%	5.5%
Unicoi	0.3%	0.0%	4.8%	3.1%	8.3%
Washington	1.2%	1.0%	0.8%	56.7%	59.7%
Total	15.2%	5.1%	6.3%	73.4%	100.0%

6.0 MODE SPLIT MODEL

The development of a true utility-based mode choice model was not planned in this update due to the lack of a local survey, the high level of investment required to create a sound mode choice model, and the relatively low number of non-auto users. The existing 2012 model used a flat factor per trip purpose to convert person trips to auto trips. In this model update, an improved factoring process is used. For each trip purpose a set of conversion factors were developed based on the travel distance between production-attraction zone pairs. These factors were developed using the National Household Travel Survey (NHTS) 2009 Add-on data for small MSA areas with population less than 500,000 in Tennessee and Virginia. The auto mode shares by trip purpose are shown in **Table 6-1** below:

Table 6-1 Auto Mode Share by Travel Distance

P-A Distance	HBW	HBSC	HBSP	HBSR	HBO	NHB
0 - 0.5 miles	0.698	0.338	0.433	0.130	0.308	0.528
0.5 - 1 miles	0.698	0.412	0.669	0.160	0.541	0.697
1 - 2 miles	0.913	0.412	0.966	0.558	0.881	0.937
2 - 3 miles	0.913	0.602	0.988	0.822	0.984	0.963
3 - 4 miles	0.923	0.602	0.988	0.968	0.984	0.963
4 - 5 miles	0.923	0.602	0.988	0.968	0.984	0.963
> 5 miles	0.970	0.693	0.992	0.987	0.992	0.968

The factors can be read as fractions. For example, a HBW factor of 0.7 for trips less than half mile means 70% of these trips are automobile trips. As the trip distance increases, the share of non-auto trips decreases. This approach allows a slightly more realistic conversion, as travel distance is a statistically significant variable in most mode choice models.

Table 6-2 shows the auto mode share by trip purpose after these mode split factors are applied.

Table 6-2 Aggregated Auto Mode Share by Trip Purpose

Trip Purpose	Total Person Trips	Auto Mode Person Trips	Auto Mode Share
HBW	130,430	122,558	94.0%
HBSC	62,545	36,532	58.4%
HBSP	157,214	149,623	95.2%
HBSR	101,229	87,100	86.0%
HBO	122,714	116,359	94.8%
NHB	281,785	261,456	92.8%

7.0 EXTERNAL MODELS

As discussed in **Section 2.5**, a total of 39 external stations are included in the Johnson City Model. **Figure 1-6** shows the external station locations.

7.1 External Trip Splits and Time of day Factors

The number of base year vehicle trips at each external station was set equal to the average daily traffic (ADT) traffic count at the station. Using the observed vehicle classification, time-of-day, and other information, the ADTs at external stations are further divided by the following components, as shown in **Figure 7-1**:

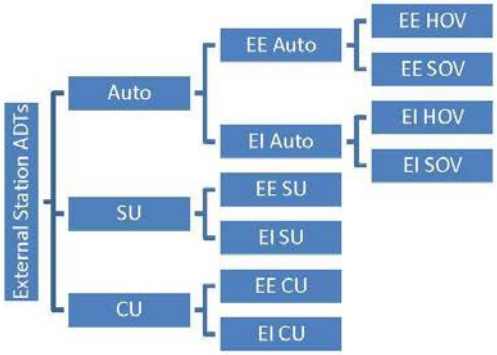


Figure 7-1 Split of External Travel Demand

Vehicle Classification Splits

Three vehicle classes are modeled and assigned to the highway network in model: Auto, Single-Unit Truck (SU), and Combination-Unit Truck (CU). ADTs at all external stations are split into these three vehicle classes. Auto, SU, and CU percentages were based on the vehicle classification counts conducted by Tennessee Department of Transportation (TDOT) and North Carolina Department of Transportation (NCDOT). For a limited number of stations, vehicle classification counts were available for 2015 or recent years. If no information was available, data from adjacent years or average values from other external stations with the same functional classification were used. **Table 8-1** shows the ADT and vehicle classification splits at each external station.

External-External (EE) and External-Internal (EI) Splits

The new Tennessee Statewide Travel Demand Model was the primary source of data used to determine the percent splits between EE and EI trips at each external station. A through trip matrix was developed with the Statewide Model that identified the total number of trips and the through trips for major external stations. This matrix was then used to calculate the percent EE trips for each external station by dividing the through trips by the total trips in the Statewide Model. Since autos and trucks (SU and CU) are modeled separately in the Statewide Model, the through trips were also determined separately for automobiles and trucks. EE and EI splits for low volume roads (local or collector roads with less than 1,000 daily traffic) were asserted based on typical values reported by the Statewide Model. EE and EI percentages are shown in **Table 7-2**.

Time-of-day Splits

Time-of-day trip factors for external stations were developed using 24-hour traffic counts collected from TDOT, VDOT, and the MTPO. Like the internal person trips, these factors are applied after trip generation to split the external trips into four time-of-day periods. Since only limited time-of-day data is available for a particular vehicle type, the time-of-day factors are applied equally to all vehicle types (Auto, SU trucks, and CU trucks). **Table 7-3** shows the external time-of-day trip factors at each external station. As described in **Section 4.3**, the AM peak period is form 6:00 AM – 9:00 AM, the midday peak period is from 9:00 AM – 3:00 PM, the PM peak period from 3:00 PM – 6:00 PM, and the night off peak is from 6:00 PM – 6:00 AM.

Table 7-1 External Station ADT and Vehicle Classification Splits

ID	Name	State	Func. Class	ADT	ADT Data Source	% Auto	% SU	% CU	Data Source*
501	Horton Hwy	TN	8	677	TDOT	99.0%	1.0%	0.0%	TDOT
502	I-81	TN	1	26,170	TDOT	60.8%	5.4%	33.8%	TDOT
503	Jearoldstown Rd	TN	8	1,000	Est.	97.2%	1.3%	1.5%	Est.
504	Highway 93	TN	6	1,500	TDOT	95.0%	2.0%	3.0%	TDOT
505	Old Ducktown Rd	TN	8	118	TDOT	99.0%	1.0%	0.0%	Est.
506	Milburnton Rd	TN	8	337	TDOT	97.0%	3.0%	0.0%	TDOT
507	Bowmantown Rd	TN	8	1,000	Est.	99.0%	1.0%	0.0%	Est.
508	Highway 11E	TN	2	12,172	TDOT	97.0%	1.0%	2.0%	TDOT
509	SR 107	TN	6	4,487	TDOT	93.0%	2.0%	5.0%	TDOT
510	SR 352	NC	7	270	NCDOT	92.8%	6.6%	0.7%	NCDOT
511	I-26	NC	1	8,800	TDOT	76.0%	5.0%	19.0%	TDOT
512	Highway 19W	NC	7	110	TDOT	96.2%	3.8%	0.0%	NCDOT
513	Rock Creek Rd	NC	7	270	TDOT	96.4%	3.0%	0.6%	NCDOT
514	Unicoi Dr	NC	7	860	TDOT	90.0%	6.9%	3.0%	NCDOT
515	Hughes Gap Rd	NC	8	677	TDOT	90.0%	6.9%	3.0%	NCDOT
516	SR 143	NC	7	90	TDOT	99.0%	1.0%	0.0%	Est.
517	Highway 19E	NC	6	4,762	TDOT	93.0%	1.0%	6.0%	NCDOT
518	Buck Mtn Rd	NC	8	250	TDOT	98.0%	1.0%	1.0%	NCDOT
519	Poga Rd	NC	8	185	TDOT	98.0%	1.0%	0.0%	Est.
520	Highway 321	TN	2	1,003	TDOT	94.0%	2.0%	4.0%	TDOT
521	Buntontown Rd	TN	8	170	TDOT	99.0%	1.0%	0.0%	Est.
522	SR 67	TN	6	3,880	TDOT	95.0%	2.0%	3.0%	TDOT
523	SR 91	TN	7	581	TDOT	98.0%	1.0%	1.0%	TDOT
524	Rockhold Rd	TN	7	1,795	TDOT	93.0%	6.0%	1.0%	TDOT
525	Highway 390	TN	17	4,970	TDOT	98.0%	1.0%	1.0%	TDOT
526	Highway 11E	TN	14	22,488	TDOT	96.0%	2.0%	2.0%	TDOT
527	Enterprise Rd	TN	17	1,293	TDOT	97.0%	2.0%	1.0%	TDOT
528	Devault Bridge Rd	TN	8	1,624	TDOT	94.8%	3.4%	1.8%	TDOT
529	Highway 75	TN	16	8,946	TDOT	96.0%	2.0%	2.0%	TDOT
530	Fort Henry Dr	TN	14	9,276	TDOT	98.0%	1.0%	1.0%	TDOT
531	Liberty Church Rd	TN	17	1,100	TDOT	99.0%	1.0%	0.0%	Est.
532	Old Fordtown Rd	TN	17	207	TDOT	99.0%	1.0%	0.0%	Est.
533	Eastern Star Rd	TN	17	2,532	TDOT	99.0%	1.0%	0.0%	Est.
534	I-26	TN	11	49,244	TDOT	92.0%	2.0%	6.0%	TDOT
535	Fordtown Rd	TN	17	1,184	TDOT	95.0%	2.0%	3.0%	TDOT
536	I-81	TN	11	25,766	TDOT	61.0%	5.0%	34.0%	TDOT
537	Rock Spring Rd	TN	17	677	TDOT	97.0%	3.0%	0.0%	TDOT
538	Mill Creek Rd	TN	8	474	TDOT	99.0%	1.0%	0.0%	Est.
539	Highway 93	TN	2	4,091	TDOT	98.0%	1.0%	1.0%	TDOT

*** Estimated** – Station specific data is not available. Values from nearby counts on the same road, or average values from other external stations with the same functional classification are used.

Table 7-2 External Station EE/EI Splits

ID	Name	% EE Auto	% EE SU	% EE CU	Data Source*
501	Horton Hwy	100.0%	100.0%	100.0%	TN Statewide Model
502	I-81	94.0%	80.0%	100.0%	TN Statewide Model
503	Jearoldstown Rd	0.0%	0.0%	0.0%	TN Statewide Model
504	Highway 93	40.0%	97.4%	97.4%	TN Statewide Model
505	Old Ducktown Rd	0.0%	0.0%	0.0%	Estimated
506	Milburnton Rd	0.0%	0.0%	0.0%	Estimated
507	Bowmantown Rd	0.0%	0.0%	0.0%	Estimated
508	Highway 11E	2.7%	7.1%	7.1%	TN Statewide Model
509	SR 107	4.7%	4.0%	4.0%	TN Statewide Model
510	SR 352	0.0%	0.0%	0.0%	TN Statewide Model
511	I-26	31.5%	42.6%	42.6%	TN Statewide Model
512	Highway 19W	0.0%	0.0%	0.0%	TN Statewide Model
513	Rock Creek Rd	0.0%	0.0%	0.0%	TN Statewide Model
514	Unicoi Dr	1.0%	5.5%	5.5%	TN Statewide Model
515	Hughes Gap Rd	0.0%	0.0%	0.0%	TN Statewide Model
516	SR 143	0.0%	0.0%	0.0%	TN Statewide Model
517	Highway 19E	10.7%	12.3%	12.3%	TN Statewide Model
518	Buck Mtn Rd	0.0%	0.0%	0.0%	Estimated
519	Poga Rd	0.0%	0.0%	0.0%	Estimated
520	Highway 321	30.4%	88.6%	88.6%	TN Statewide Model
521	Buntontown Rd	0.0%	0.0%	0.0%	TN Statewide Model
522	SR 67	8.7%	10.1%	10.1%	TN Statewide Model
523	SR 91	0.0%	0.0%	0.0%	TN Statewide Model
524	Rockhold Rd	4.5%	8.3%	8.3%	TN Statewide Model
525	Highway 390	1.0%	3.3%	3.3%	TN Statewide Model
526	Highway 11E	4.8%	9.3%	9.3%	TN Statewide Model
527	Enterprise Rd	0.0%	0.0%	0.0%	TN Statewide Model
528	Devault Bridge Rd	0.3%	1.2%	1.2%	TN Statewide Model
529	Highway 75	0.8%	1.9%	1.9%	TN Statewide Model
530	Fort Henry Dr	0.3%	2.7%	2.7%	TN Statewide Model
531	Liberty Church Rd	0.0%	0.0%	0.0%	TN Statewide Model
532	Old Fordtown Rd	0.0%	0.0%	0.0%	TN Statewide Model
533	Eastern Star Rd	17.1%	80.9%	80.9%	TN Statewide Model
534	I-26	6.7%	23.0%	23.0%	TN Statewide Model
535	Fordtown Rd	0.0%	48.9%	48.9%	TN Statewide Model
536	I-81	77.8%	80.0%	99.0%	TN Statewide Model
537	Rock Spring Rd	0.0%	0.0%	0.0%	TN Statewide Model
538	Mill Creek Rd	0.0%	0.0%	0.0%	TN Statewide Model
539	Highway 93	78.5%	82.6%	82.6%	TN Statewide Model

*** Estimated** – Station specific data is not available. Values from nearby counts on the same road, or average values from other external stations with the same functional classification are used.

Table 7-3 External Station Time-of-day Factors

ID	Name	State	Func. Class	AM	MD	PM	OP	Data Source*
501	Horton Hwy	TN	8	17%	32%	25%	26%	TDOT
502	I-81	TN	1	13%	36%	20%	31%	TDOT
503	Jearoldstown Rd	TN	8	20%	31%	25%	24%	Est.
504	Highway 93	TN	6	21%	31%	26%	22%	TDOT
505	Old Ducktown Rd	TN	8	8%	38%	24%	30%	TDOT
506	Milburnton Rd	TN	8	15%	31%	22%	32%	TDOT
507	Bowmantown Rd	TN	8	16%	34%	25%	24%	Est.
508	Highway 11E	TN	2	19%	36%	24%	21%	TDOT
509	SR 107	TN	6	16%	34%	25%	25%	TDOT
510	SR 352	NC	7	16%	37%	21%	26%	Est.
511	I-26	NC	1	14%	40%	19%	27%	Est.
512	Highway 19W	NC	7	15%	39%	22%	23%	Est.
513	Rock Creek Rd	NC	7	12%	38%	24%	26%	Est.
514	Unicoi Dr	NC	7	14%	35%	24%	28%	Est.
515	Hughes Gap Rd	NC	8	14%	35%	24%	28%	Est.
516	SR 143	NC	7	1%	56%	30%	13%	Est.
517	Highway 19E	NC	6	16%	37%	25%	22%	Est.
518	Buck Mtn Rd	NC	8	22%	40%	20%	17%	Est.
519	Poga Rd	NC	8	15%	37%	25%	23%	Est.
520	Highway 321	TN	2	14%	39%	25%	21%	TDOT
521	Buntontown Rd	TN	8	17%	35%	26%	21%	TDOT
522	SR 67	TN	6	17%	38%	23%	22%	TDOT
523	SR 91	TN	7	12%	37%	26%	26%	TDOT
524	Rockhold Rd	TN	7	20%	30%	26%	24%	TDOT
525	Highway 390	TN	17	20%	30%	26%	25%	TDOT
526	Highway 11E	TN	14	18%	34%	25%	23%	TDOT
527	Enterprise Rd	TN	17	18%	33%	22%	27%	TDOT
528	Devault Bridge Rd	TN	8	14%	30%	26%	30%	TDOT
529	Highway 75	TN	16	18%	34%	24%	24%	TDOT
530	Fort Henry Dr	TN	14	17%	35%	24%	25%	TDOT
531	Liberty Church Rd	TN	17	16%	33%	26%	25%	TDOT
532	Old Fordtown Rd	TN	17	8%	35%	39%	18%	TDOT
533	Eastern Star Rd	TN	17	18%	35%	25%	22%	TDOT
534	I-26	TN	11	20%	34%	23%	23%	TDOT
535	Fordtown Rd	TN	17	16%	29%	25%	30%	TDOT
536	I-81	TN	11	12%	36%	20%	32%	TDOT
537	Rock Spring Rd	TN	17	12%	32%	23%	33%	TDOT
538	Mill Creek Rd	TN	8	13%	30%	25%	33%	TDOT
539	Highway 93	TN	2	14%	35%	29%	22%	TDOT

*** Estimated** – Station specific data is not available. Values from nearby counts on the same road, or average values from other external stations with the same functional classification are used.

7.2 External Auto Trip Generation and Balancing

As shown in **Figure 8-1**, after applying the trip split factors to external station ADTs, external trips can be sub-divided into the following groups:

- EE (through) trips (Auto, SU, and CU)
- EI trips (Auto, SU, and CU)

External-External (Through) Auto Trips

Through auto trips were directly modeled as half in-bound and half out-bound trips. At each external station, for each time of day period:

$$EE\ IB/OB\ Trips_{auto} = ADT \times Percent_{auto} \times Percent_{tod} \times Percent_{EE\ Auto} \div 2$$

External-Internal (EI) Auto Trips

EI auto trips are assumed to be produced at external stations and attracted to internal zones. Total auto trips produced at each external station are:

$$EI\ Trip\ Production_{\ Auto} = ADT \times Percent_{Auto} \times Percent_{tod} \times Percent_{EI\ Auto}$$

EI auto attractions were derived at the TAZ level based on various employment categories and total number of households. Linear regression models based on employment and number of households in each internal zone were developed for EI auto trip attractions. The linear regression coefficients were estimated using the 2010 base year trip table from the Statewide Model. The number of EI trips attracted to internal zones is given by the formula:

$$A_{EI\ Auto} = \sum_j c_j \times E_j$$

Where:

$A_{EI\ Auto}$ = Trip Attractions for EI Auto Trips
c_j = Coefficient for independent variable j
E_j = Value of independent variable j

Estimated EI Auto trip attraction rates are summarized in **Table 7-4**. The resulting total number of productions and attractions for EI Auto trips is shown in **Table 7-5**. When balancing the productions and attractions, EI Auto trip productions were held constant at the external station locations since there is a higher level of certainty with the volumes at these locations than the attractions being derived at the TAZ level.

Table 7-4 EI Auto Trip Attraction Model Coefficients (c_i)

Variable	Coefficients	t Value (Linear Regression)
Employment (Office)	1.595	6.13
Total Number of Households	1.057	8.67

Table 7-5 Trip Production and Attraction Totals for EI Auto Trips

Trip Purpose	Productions	Attractions	% Difference
EI Auto	135,064	131,248	-2.8%

7.3 External Auto Trip Distribution

External trips are distributed using a gravity model. Gravity models were developed for EE and EI Auto trips respectively.

K Factor Matrix for EE Auto Trips

To obtain desired interchanges for EE trips, K-factors are applied to adjust the gravity distribution algorithm. The Statewide Model was used to derive a target through trip matrix for EE Auto trips. All other OD interchanges not included in the Statewide model were manually assigned to the target trip table based on the characteristics of the network and the proportional demand at each external station. This target trip table was then used to calibrate the K-factor matrix and the friction factor parameters for EE Auto gravity model.

Friction Factors

For EE Auto trips, K-factor matrix and Inverse Power parameters were estimated together from the target matrix to produce matching distribution between external stations. Average trip length for EE Auto trips is approximately 17.2. The main reason for relatively low trip length is that through trips on I-81 are very short trips passing through north-west corner of the model boundary.

For EI Auto trips, gamma function parameters were adjusted in an iterative process to produce reasonable average trip lengths for EI Auto trips based on the size of the region. The calibrated average trip length for EI Auto trips is approximately 21.3 minutes in travel time. **Table 7-6** shows the calibrated gamma function parameters for each external auto trip type.

Table 7-6 Calibrated Gamma Function Parameters (EE and EI Auto Trips)

External Trip Type	Gravity Model Parameters	
	B	c
EI Auto	3.500	0.900
EE Auto	0.822	-

8.0 TRUCK MODELS

In the Johnson City model, truck travel was estimated for three vehicle classification types: four-tire commercial vehicles (Light Truck), single unit trucks with six or more tires (SU), and combination trucks (CU). Total truck trips using the highway network can be divided into three types: External-External (EE), External–Internal(EI), and Internal trips, as shown in **Figure 8-1**.

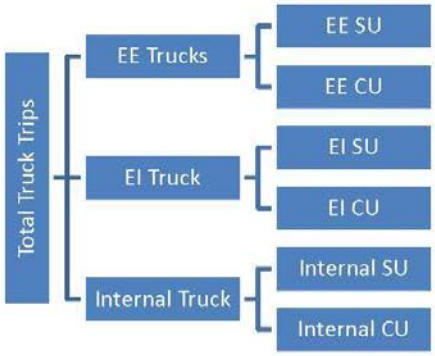


Figure 8-1 Truck Trips Simulated in Johnson City Model

Truck models for the Johnson City Model were developed using the methodology outlined in Chapter 4 of the **Quick Response Freight Manual II**, FHWA, 2007 (QRFM).

8.1 External-External (EE) Truck Trip Generation

Through truck trips were directly modeled as half in-bound and half out-bound trips at each external stations for each time of day period:

$$EE\ IB/OB\ Trips_{SU\ or\ CU} = ADT \times Percent_{SU\ or\ CU} \times Percent_{tod} \times Percent_{EE\ SU\ or\ CU} \div 2$$

8.2 External-Internal Truck Trip Generation

EI truck trips are assumed to be produced at external stations and attracted to internal zones. Truck trips produced at each external station are:

$$EI\ Trip\ Production_{\ SU\ or\ CU} = ADT \times Percent_{SU\ or\ CU} \times Percent_{tod} \times Percent_{EI\ SU\ or\ CU}$$

EI attractions were derived at the TAZ level based on various employment categories and total number of households. Linear regression models based on employment and number of households in each internal zone was developed for EI truck trip attractions.

Linear regression coefficients for EI CU trucks were estimated using the 2012 American Transportation Research Institute (ATRI) trip tables provided by TDOT. Using the QRFM employment by TAZ as explanatory variables, the number of EI trips attracted to internal zones is given by the formula:

$$A_{EI\ (SU\ or\ CU)} = \sum_j c_j \times E_j$$

Where:

$A_{EI\ (SU\ or\ CU)}$ = Trip Attractions for EI SU or CU Truck Trips

c_j = Coefficient for independent variable j

E_j = Value of independent variable j

Because the ATRI data set is predominately reported by heavy trucks, the linear regression process was conducted at the model district levels for CU Trucks only. QRFM employment numbers were first aggregated to the planning districts. All EI truck trips in the ATRI truck table were used as the observed variable to estimate the linear regression coefficients for the EI CU trucks. Estimated EI CU Truck trip attraction rates are summarized in **Table 8-1**.

Table 8-1 EI CU Truck Trip Attraction Model Coefficients (c_j)

QRFM Employment Category	Coefficients	t Value (Linear Regression)
Manufacturing, Transportation/ Communications/Utilities, and Wholesale	0.096	3.93
Retail	0.160	4.72
Total Households	0.019	2.02

The QRFM default SU truck trip rates were used by the Johnson City model as attraction rates. The QRFM default trip rates are based on surveys from Phoenix, Arizona region, as shown in **Table 8-2**.

Table 8-2 EI SU Truck Trip Attraction Model Coefficients (c_j)

QRFM Employment Category	QRFM Default SU Rates
Agriculture, Mining, and Construction	0.289
Manufacturing, Transportation/ Communications/Utilities, and Wholesale	0.242
Retail	0.253
Office and Services	0.068
Total Households	0.099

When balancing the productions and attractions, EI Truck trip productions were held constant at the external station locations since there is a higher level of certainty with the volumes at these locations than the attractions being derived at the TAZ level.

8.3 Internal Truck Trip Generation

Internal truck trip generation is based on the linear regression models by various employment categories and number of households as defined in the QRFM procedures:

$$Internal\ Truck\ Trips_{Class\ i} = \sum_j c_j \times E_j$$

Where:

$Class_i$ = Light Truck, SU, and CU trucks

c_j = Coefficient for independent variable j
E_j = Value of independent variable j

Similar to EI truck trips, CU truck rates were estimated using the ATRI data set at the planning district levels. QRFM employment categories were used as explanatory variables. All internal truck trips in the ATRI truck table were used as the observed variable to estimate the linear regression coefficients for internal CU trucks. A scaling factor was applied to these rates during the assignment calibration process. Estimated internal CU Truck trip attraction rates and the final scaled rates are summarized in **Table 8-3**.

Table 8-3 Internal CU Truck Trip Generation Rates (c_j)

QRFM Employment Category	Estimated CU Rates from ATRI	t Value (Linear Regression)	Scaling Factor for Model
Retail	0.780	4.26	0.5
Service	0.3019	4.76	0.5

Attraction rates for Light and SU trucks were obtained by scaling the QRFM default truck trip rates during the assignment calibration process comparing with the observed classification counts. The default trip rates and the scaling factors are shown in **Table 8-4**.

Table 8-4 Adjusted Light and SU Truck Trip Rates (c_j)

QRFM Employment Category	QRFM Default SU Truck Rates	SU Scaling Factor for Model	QRFM Default Light Truck Rates	Light Truck Scaling Factor for Model
Agriculture, Mining, and Construction	0.289	0.4	1.110	0.5
Manufacturing, Transportation/ Communications/Utilities, and Wholesale	0.242	0.4	0.938	0.5
Retail	0.253	0.4	0.888	0.5
Office and Services	0.068	0.4	0.437	0.5
Total Households	0.099	0.4	0.251	0.5

Production and attractions for internal truck trips are 50/50 splits after the total demand is estimated. **Table 8-5** shows the total truck trips by trip type.

Table 8-5 Total Truck Trips by Category and Type

Truck Category	Type	Trips	Percent within Truck Category
Light Truck	Internal	19,670	100%
SU Truck	Internal	4,326	49.2%
	EI	3,136	35.7%
	EE	1,324	15.1%
CU Truck	Internal	6,558	31.0%
	EI	4,999	23.6%
	EE	9,585	45.3%

8.4 Time-of-Day Splits for Internal Truck Trips

Time-of-day split factors for internal truck trips were developed from the traffic counts. All traffic counts collected within the region with both vehicle classification and time-of-day information were used to develop the time-of-day period splits for Auto, SU, and CU classes. Because the traffic counts cannot distinguish light trucks with autos, auto time-of-day distribution was used for light trucks. **Table 8-6** shows the time-of-day splits of truck trips by category.

Table 8-6 Time of Day Factors for Truck Trips

Time Period	Time Range	Light Truck %	SU %	CU %
AM	6 AM - 9 AM	16.6%	16.1%	14.9%
Midday (MD)	9 AM - 3 PM	35.3%	35.6%	36.0%
PM	3 PM - 6 PM	23.7%	22.7%	21.3%
Off-peak (OP)	6 PM - 6 AM	24.5%	25.6%	27.8%
Total		100%	100%	100%

8.5 Truck Trip Distribution

Truck trips are distributed using gravity models. Gravity models were developed and calibrated for each of the following truck types:

- Internal Light Trucks
- Internal SU trucks
- EI SU Trucks
- EE SU Trucks
- Internal CU Trucks
- EI CU Trucks
- EE CU trucks

Friction Factors and K Factors

For EE trips, K-factor matrix and Inverse Power function parameters were estimated together from the target matrix developed from the Statewide Model to produce matching distribution between external stations.

For internal and EI truck trips, no K factors were used. Gamma functions were used for II and EI truck trip friction factors. Gamma function parameters were adjusted in an iterative process to produce reasonable average trip length for truck trips based on the size of the region and the trip lengths for internal trip purposes. **Table 8-7** shows the calibrated friction factor function parameters for each external trip type.

Table 8-7 Calibrated Gamma Function Parameters (Truck Trips)

External Trip Type	Friction Factor Parameters	
	b	c
Internal Light Truck	0.01	0.085
Internal SU	3.5	0.9
EI SU	1.75	0.95
EE SU	0.6648	-
Internal CU	0.01	0.001
EI CU	1.75	0.95
EE CU	0.5559	-

Table 8-8 shows the average trip length for each truck trip type. For comparison, the average trip length for internal home-based work trip is approximately 15.4 minutes, and average trip length for EI auto trips is approximately 17.1 minutes.

Table 8-8 Truck Average Trip Length

Truck Trip Type	Average Trip Length (min.)
Internal Light Truck	18.56
Internal SU	19.20
EI SU	23.69
EE SU	16.16
Internal CU	19.56
EI CU	23.65
EE CU	10.98

8.6 Directional Splits for Truck Trips

All internal truck trips are distributed in production-attraction (PA) format. After the gravity model, the 50/50 splits were applied to all internal trucks to convert the trip matrix from PA to OD format, similar to the non-home based (NHB) internal trip purpose.

EI SU and CU trucks were also in PA format after the gravity model. The production end is at the external stations and attractions are at each internal TAZ. 50% in-bound and out-bound factors at each external stations are applied to the PA vector to split the total number of trips to in-bound (from external station to internal TAZs) and out-bound (from internal TAZs to external station). After this process, the EI truck trip tables are ready to be assigned to the highway network.

9.0 DIRECTIONAL SPLITS AND PERSON TRIP TO VEHICLE TRIP CONVERSION

After mode split, all internal trips are in a Production zone to Attraction zone (PA) format. To assign the trips to the network, trip tables must be converted to an Origin-Destination (OD) format. In addition, person trips that shared rides must be converted to vehicular trips by applying vehicle occupancy factors. This section discusses the methodology used to convert the trips from PA to OD format, and to convert person trips to vehicular trips for shared ride trips.

9.1 PA to OD (Directional Splits)

For all internal trip purposes, person trips using the automobile mode predicted by the mode split model are the total number of trips produced from home zone and attracted to the attraction zones. To convert these trips from PA to OD format, departure and return rates by trip purpose and time-of-day period must be known. Using the home-based work trip purpose as an example, trips from home to work in the AM have the trip origin as home and destination as the work place. Similarly, trips returning home from work in the AM have the trip origin as work place and destination as home. These departure and return rates can be applied to the PA trip tables as directional splits to convert them to an OD format. The directional split factors were developed by trip purpose and time-of-day period using the NHTS 2009 Tennessee and Virginia Add-on data. **Table 9-1** shows the directional splits by time-of-day period and trip purpose.

Table 9-1 Time-of-day Directional Splits (Post-Mode Split)

Trip Purpose	AM		MD		PM		OP	
	Departure	Return	Departure	Return	Departure	Return	Departure	Return
Home-based Work	98.75%	1.25%	61.16%	38.84%	11.33%	88.67%	31.84%	68.16%
Home-based School	98.16%	1.84%	28.38%	71.62%	10.96%	89.04%	29.21%	70.79%
Home-based Shopping	74.68%	25.32%	49.02%	50.98%	38.11%	61.89%	33.91%	66.09%
Home-based Social Recreational	74.34%	25.66%	61.46%	38.54%	50.04%	49.96%	35.51%	64.49%
Home-based Other	80.55%	19.45%	59.11%	40.89%	42.49%	57.51%	33.28%	66.72%
Non-home Based	50.00%	50.00%	50.00%	50.00%	50.00%	50.00%	50.00%	50.00%
Total	**81.59%**	**18.41%**	**52.47%**	**47.53%**	**39.15%**	**60.85%**	**37.39%**	**62.61%**

Note that non-home based trips do not have the home end as an origin or destination point. They are assumed to be equally distributed in both directions and a 50/50 split is applied.

Directional splits for external and truck trips were discussed in **Section 7 and 8**.

9.2 Person Trip to Vehicular Trip Conversion

The mode split model predicts the number of person trips using automobile mode. The auto mode consists of auto trips with one or more passengers. Auto occupancy factors by trip purpose and time-of-day were applied to convert the person trips to auto trips. These factors were developed using the NHTS 2009 dataset. **Table 9-2** shows the average auto occupancy factors.

Table 9-2 Average Auto Occupancy for Auto Trips

Trip Purpose	AM	MD	PM	OP
Home-based Work	1.08	1.10	1.06	1.09
Home-based School	1.89	1.47	2.01	1.61
Home-based Shopping	1.31	1.40	1.49	1.61
Home-based Social Recreational	1.38	1.53	1.67	1.61
Home-based Other	1.73	1.68	1.67	1.71
Non-home Based	1.28	1.47	1.57	1.63

Using home-based school in the AM peak period as an example, average auto occupancy is 1.89 persons per auto. To apply the factors, the auto person trips for home-based school purpose in the AM are divided by 1.89 to get the number of auto vehicle trips.

External and truck trips are vehicular trips from trip generation step. No conversion is needed for external and truck trips.

After converting all trip tables to origin-destination format and vehicular trips, they are aggregated and assigned to the highway network. Assignment methodologies are discussed in the following sections.

10.0 HIGHWAY ASSIGNMENT METHODOLOGY

Highway assignment has two steps: a multimodal multi-class (MMA) all-or-nothing preload assignment, and a MMA User Equilibrium (UE) assignment. The initial all-or-nothing assignment is used to "preload" through trips and large commercial vehicle trips. These trips are less sensitive to travel time and do not reroute trips based on congestion as often as trips such as an internal home-based-work auto trip. An MMA assignment is a generalized cost assignment that lets you assign trips by individual modes or user classes to the network simultaneously. This setup offers several advantages, including the flexibility to model High-Occupancy Vehicle (HOV) lanes, passenger car equivalencies for trucks, and exclusion of no-truck routes for trucks only.

The two steps of assignments (preload and equilibrium) are applied for each of the four time periods (AM, midday, PM, and off-peak), which yields a total of eight assignment routines for the Johnson City model. Volume-delay functions used for the assignment are based on time and period capacity and are modified versions of the Bureau of Public Road (BPR) curves. The volume-delay curves have varied coefficients for different roadway functional classification and link speed.

10.1 MMA All-or-Nothing Preload Assignment

The first step of the highway assignment procedure is to "preload" through trips. The preload assignment uses an all-or-nothing method, which assigns trips between origin-destination pairs based on the shortest path established by the free-flow travel time. This assignment procedure is intended to reflect the insensitivity congestion has on external trips, especially long-haul truck trips, since they are typically much less likely to divert to another roadway than other types of trips, either due to lack of knowledge about the area, perceived inconvenience, or restrictions against heavy trucks.

The following trip tables are loaded during the preload assignment procedure for each time period:

- External automobile
- External single-unit (SU) trucks
- External combination-unit (CU) trucks

External trips includes external-external (EE, through trips) and external-internal (EI) trips. Since there is no reflection of delay in the choice of path for these trips, no volume-delay function is required and only one assignment iteration is required.

10.2 MMA User Equilibrium Assignment

The second step of the highway assignment procedure is to load all remaining trips not considered in the preload assignment. Preloaded trips are addressed in the assignment procedures as background traffic that reduces capacity but does not divert to another route. The remaining trips are loaded using an MMA user-equilibrium assignment, which assigns trips between origin-destination pairs in an iterative fashion that accounts for link congestion on route choice. The user-equilibrium assignment procedure computes the link travel time, assigns link traffic based on shortest path, and then recalculates the link travel time. This step is repeated until the user equilibrium conditions are met: all used paths for each O-D pair are minimal and equal; and any unused path for a given O-D pair has a greater travel time than any used paths for that O-D pair. In TransCAD's implementation, the convergence of user equilibrium is measured by the "relative gap," which is an estimate of the "distance" between current solution and the user equilibrium solution. The relative gap is defined as follows:

$$\text{Relative gap} = \frac{\sum_{\forall links} x_i^{UE\,t} - \sum_{\forall links} x_i^{AON\,t}}{\sum_{\forall links} x_i^{UE\,t}}$$

Where:

x_i^{UE} = Current flow on link i

x_i^{AON} = All-or-nothing flow on link i

x_i^{UEt} = Current travel time on link i

The traffic assignment will stop when the current iteration relative gap is below a user specified threshold or the maximum number of iterations is reached.

For UE assignment, internal light trucks are combined with internal auto trips, and are assigned to the network as automobile trips.

Volume-Delay Function

The Johnson City model uses the Bureau of Public Roads (BPR) formula as the volume-delay function to relate travel time to the volume/capacity ratio. The BPR formula is shown below,

$$T_N = T_0 * \left[1 + 0.15\left(\frac{V}{C}\right)^4\right]$$

Where:

T_N = Congested link travel time
T_0 = Initial link travel time under free-flow conditions
V = Assigned traffic volume
C = Capacity

In the equation, the coefficient 0.15 is known as the *alpha* value and the exponent of 4 is known as the *beta* value. Different functionally classified roads are known to have different alpha and beta values. The values of 0.15 and 4 are recognized as the most generic. The alpha and beta settings are based on the type of facility and its posted speed. Settings are automatically applied in the GISDK code and have been developed based on the coefficients presented in **NCHRP Report 716**. **Table 10-1** lists the alpha and beta settings, by functional classification, for the Johnson City model.

Table 10-1 Alpha and Beta Settings by Speed and Functional classification

Roadway Functional Classification	Free Flow Speed >= 70 mph		Free Flow Speed >= 55 and <70 mph		Free Flow Speed <55 mph	
	Alpha	Beta	Alpha	Beta	Alpha	Beta
Freeways	0.88	9.8	0.83	5.5	0.56	3.6
Multilane Highways	1.0	5.4	0.83	2.7	0.71	2.1
2-lane Roads	0.71	2.1	0.71	2.1	0.71	2.1
Centroid Connectors	1.0	5.4	1.0	5.4	1.0	5.4

Link Capacity

The hourly capacities of roadways in the Johnson City model are calculated using the capacity equations presented in **Section 3.4**. The capacity calculation is fully integrated into the model process. Roadway improvements in future year scenarios are automatically accounted for in future year model runs.

Since the model is based on four multi-hour time periods, a conversion factor must be used to create a time period capacity for each of the four time periods. The capacity factors below are based on the hourly traffic count data and the Johnson City household travel survey. The initial values of the time-of-day capacity factor were based on the following equation:

$$\text{Capacity Factor} = \frac{\text{Total Time Period Volume}}{\text{Peak Hour Time Period Volume} \times \text{Number of Hours in Time Period}}$$

The time-of-day capacity factors were adjusted based on the highway assignment results during the model calibration process. Final factor values are shown in **Table 10-2** below.

Table 11-2 Hourly to Time-of-day Period Capacity Factors

Time Period	Time Range	Period Length	Capacity Factor
AM	6 AM - 9 AM	3 Hours	1.6
Midday (MD)	9 AM - 3 PM	6 Hours	2.7
PM	3 PM - 6 PM	3 Hours	1.6
Off-peak (OP)	6 PM - 6 AM	12 Hours	4.1

Free Flow Speed

Free flow travel time is calculated from free flow speed and is the input data of the volume-delay function. Free flow speeds are calculated by applying a factor to the posted speed. The free flow speed factors were adjusted in the highway assignment calibration process. **Table 10-3** shows the free flow speed adjustment factors by roadway functional classification and by area type.

Table 11-3 Free Flow Speed Adjustment Factors

Functional Classification	Area Type			
	CBD	Urban	Suburban	Rural
Freeway	1.00	1.02	1.03	1.05
Major Arterial (Posted Speed >= 45 mph)	1.00	1.15	1.17	1.20
Major Arterial (Posted Speed < 45 mph)	1.00	1.20	1.25	1.30
Minor Arterial (Posted Speed >= 45 mph)	1.00	1.12	1.15	1.15
Minor Arterial (Posted Speed < 45 mph)	0.98	1.08	1.10	1.12
Collector	0.95	1.00	1.00	1.05
Local	0.95	1.05	1.10	1.10

During the assignment calibration process, several roadway segments were over-assigned comparing with the observed traffic counts. Free flow speed on these roadway segments were manually adjusted to the posted speed to discourage travel on these roadway segments. **Table 10-4** shows the roadway segments.

Table 10-4 Free Flow Speed Adjustment Factors (Segment Specific)

Roadway Name	Segment Termini	Free Flow Speed Adjustment Factor
I-26	Okolona Rd to E Watauga Ave	1.0
US Highway 19E	Highway 11E to Broad St	1.0
SR 93	Horton Hwy to Oak Grove Ave	1.0
Boone St	E Main St to Old Boones Creek Rd	1.0

Passenger Car Equivalency (PCE) Factors

Table 10-5 shows the PCE factors for the assignment process. The same PCEs are used for both preload and user equilibrium assignment steps.

Table 10-5 Passenger Car Equivalency Factors for Assignment

Assignment Class	Passenger Car Equivalency
Auto	1.0
SU	1.5
CU	2.0

User Equilibrium Assignment Convergence Criteria

The standard user equilibrium algorithm is used for the UE assignment model. The maximum number of iterations is set to 100, and convergence is set to 0.0001.

To give the MPO maximum flexibility using and maintaining the model, all model parameters are stored in tables in the model's input folder, and can be adjusted without modifying and recompiling the GISDK code.

11.0 FEEDBACK METHODOLOGY

The objective of the feedback process is to execute the travel model system in an integrated manner so that the time outputs from the traffic assignment model are reasonably consistent with the inputs assumed at the trip distribution and mode choice steps. The trip distribution, mode choice, and trip assignment steps are repeated until a sufficient convergence — output times being close to input times — is achieved. In the Johnson City model, the Method of Successive Averages (MSA) feedback loop procedure is implemented.

In the MSA method, output volumes from trip assignment from previous iterations are weighted together to produce the current iteration's link volumes. Adjusted congested times are then calculated based on the normal volume-delay relationship. This adjusted congested time is then fed back to the skimming procedures.

The adjusted volume is calculated based on the following equation:

$$MSAFlow_n = MSAFlow_{n-1} + \frac{1}{n}(Flow_n - MSAFlow_{n-1})$$

Where:

n = current MSA iteration number
$MSAFlow_n$ = calculated MSA flow at iteration n
$Flow_n$ = resulting flow directly from trip assignment

The MSA flow and link cost created from the MMA assignment procedure is then "fed back" into the skimming procedure of the next MSA feedback iteration. The benefits of this process are that it can be applied with relatively ease of programming and convergence is assured.

Convergence Criteria

At the end of each feedback iteration, the MMA User Equilibrium Assignment Procedure can return a calculated Root Mean Square Error (RMSE) statistic that compares volumes from the current feedback iteration to volumes from the last feedback iteration. The equation used to calculate RMSE is shown below:

$$RMSE_n = \sqrt{\frac{\sum_{i=1}^{L}(x_i^n - x_i^{n-1})^2}{L-1}}$$

Where:

i = link i
L = total number of links
n = feedback iteration number
$RMSE_n$ = Root Mean Square Error for feedback iteration n
x_i^n = volume on link i, iteration n

The convergence is then checked against the predefined RMS Error threshold. If the convergence criteria are not met, the MSA flows and travel times are fed back to the next iteration. This iterative process continues until one of the following conditions is true:

- $RMSE_n < RMSE$ threshold
- Current iteration n > maximum iteration allowed

The convergence criteria used for the Johnson City model are:

- $RMSE$ threshold = 10
- Maximum iteration = 10

These thresholds were determined through sensitivity tests during the calibration process. Using these criteria, the model usually converges in four to five iterations. On a typical desktop computer, one iteration of the model run takes approximately 5 minutes. Tighter convergence criteria can be used, but improvement to the model results is marginal after 4 iterations. Both parameters can be easily changed in the model interface if tighter convergence is desired.

12.0 HIGHWAY ASSIGNMENT RESULTS AND VALIDATION

As the starting point of the model calibration effort, the initial highway assignment were made using the trip tables produced by the upstream models that were already calibrated and validated individually. The steps of model calibration involved the following calibration strategies:

- Review and eliminate highway network coding errors
- Adjust centroid connector locations based on adjacent network link loading
- Add turn penalties to eliminate illegal moves within the highway network
- Adjust Quick Response Freight Manual (QRFM) truck trip rates
- Adjust gravity model friction factors/average trip lengths
- Review VMT target based on HPMS data and traffic count data system-wide
- Revise free-flow speed factors by functional classification
- Adjust peak period capacity factors (Hourly to time-of-day period)
- Review capacity equations and volume delay function parameters by functional classification
- Adjust gravity models based on county level travel patterns

Final adjusted time-of-day factors, free flow speed factors, and gravity model parameters were presented in previous sections of this memorandum. This section presents the final highway assignment validation results after the model calibration and validation steps above. The highway assignment results were validated at varying levels of aggregation, based on the requirements from the TN Guidelines.

12.1 Vehicle Miles of Travel (VMT)

The HPMS data within the model study area were directly calculated using HPMS link data provided by TDOT. VMTs for local roads cannot be directly interpolated because not all the local roads were included in the model. The percentage of VMT on local roads in HPMS data was used to estimate the local road VMTs in each county within the model boundary. **Table 12-1** shows the VMT targets by county and by roadway functional classification.

Table 12-1 VMT Validation Targets

Functional Class	Sullivan TN (partial)	Washington TN	Unicoi TN	Carter TN	MPO Model Total
Freeway	0	846,711	377,001	52,993	1,276,705
Major Arterial	173,541	839,235	0	418,522	1,431,298
Minor Arterial	0	694,095	72,002	344,145	1,110,242
Collector	62,403	352,086	101,055	146,736	662,280
Local	2,088	488,952	85,147	143,750	719,937
Total (No Local)	235,944	2,732,127	550,058	962,396	4,480,525
Total (With Local)	238,032	3,221,079	635,205	1,106,146	5,200,462

Regional, household, and per capita VMT were computed and compared to HPMS data and other suggested ranges. Since the model does not include all local roads, model VMT for local roads was estimated by applying the same local VMT percentage from the HPMS data. **Table 12-2** compares the model VMT per person and per household with the HPMS data and TN Guidelines.

Table 12-2 VMT per Person and Household

	Model	HPMS	TN Guidelines
VMT per Person	26	27	24 - 32
VMT per Household	55	58	60 - 75

Region wide, the current model produces a VMT per capita of 26 and VMT per household of 55. These model results are within reasonable ranges compared with HPMS data and TN Guidelines.

VMT is categorized by functional classification and compared with suggested percent differences, shown in **Table 12-3**. Overall, the model is 4.8% higher than the total VMT target.

Table 12-3 Percent Difference Targets for VMT by Functional Classification (Entire Model Area)

Roadway Functional Classification	VMT		VMT Distribution		% Difference	
	Observed (HPMS Data)	Model Estimated	Observed (HPMS Data)	Model Estimated	Model Compared to Observed	TN Guidelines
Freeways	1,276,705	1,266,508	28.5%	27.0%	-0.8%	7.0%
Principal Arterials	1,431,298	1,493,023	31.9%	31.9%	4.3%	15.0%
Minor Arterials	1,110,242	1,159,200	24.8%	24.7%	4.4%	15.0%
Collectors	662,279	768,920	14.8%	16.4%	16.1%	25.0%
Total	4,480,525	4,687,651	100.0%	100.0%	4.6%	5.0%

12.2 Daily Traffic Volumes Compared to Counts

The coefficient of determination (R^2) is a useful measure to compare system-wide observed traffic counts with estimated volumes. The TN Guidelines suggest that the R^2 value be greater than 0.88 at the system level. The base year model has an R^2 value of 0.9, which is on target. **Figure 12-1** is a scatter plot of observed and model-assigned volumes.

The current root mean square error (%RMSE) is 35.3%, which is well below the acceptable RMSE value of 45% suggested by the TN Guidelines.

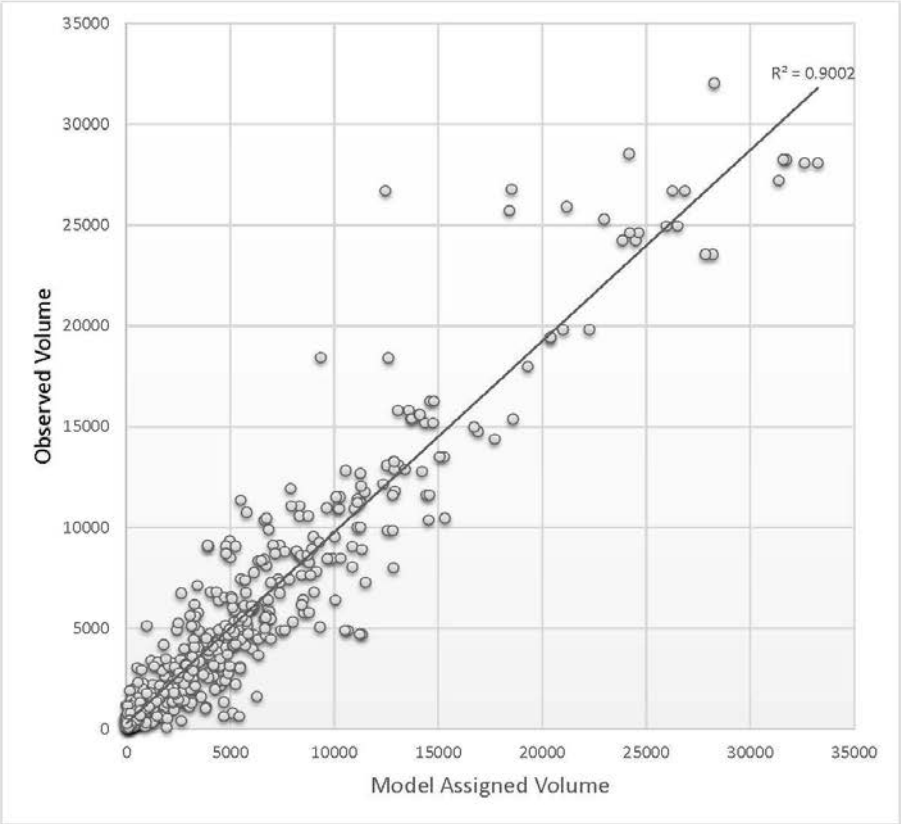


Figure 12-1 Scatter Plot of Model Assigned vs. Observed Link Traffic Volume

Table 12-4 compares the daily volumes with targets by functional classification. **Table 12-5** presents the model volumes and validation targets by volume groups. The results show that the model effectively estimates model volumes both by functional classification and volume group.

Table 12-4 Volume-to-Count Percent Difference by Functional Classification

Roadway Functional Classification	Volume Per Day		Number of Traffic Count Locations	% Difference	
	Observed (Traffic Counts)	Model Estimated		Model Compared to Observed	TN Guidelines (Target)
Freeways	617,016	635,763	42	3.0%	7%
Principal Arterials	836,885	809,293	74	-3.4%	15%
Minor Arterials	809,129	811,769	125	0.2%	15%
Collectors	416,790	427,851	223	2.9%	25%
Total	2,679,820	2,684,676	464	0.1%	-

Table 12-5 Percent Difference Volume Targets by Daily Volume Groupings

Volume Group	Volume Per Day		Number of Traffic Count Locations	% Difference	
	Observed (Traffic Counts)	Model Estimated		Model Compared to Observed	TN Guidelines (FHWA Targets)
<1,000	50,601	70,690	96	40%	200%
1,000-2,500	132,127	155,493	84	18%	100%
2,500-5,000	281,392	285,153	78	1%	50%
5,000-10,000	579,928	604,012	92	4%	25%
10,000-25,000	756,146	711,820	72	-6%	20%
25,000-50,000	714,591	675,133	36	-6%	15%
>50,000	166,056	182,373	6	10%	10%

Table 12-6 shows the %RMSE values by functional classification. All RMSE errors except minor arterials are below the target values provided by TN Guideline. For minor arterials, RMSE values are at 41% compared to 40% in the Guidelines. After careful examination of the locations with large errors, the Consultant believes that very large zones in rural areas are the major contributing factor.

Table 12-6 Root Mean Square Error (RMSE) by Functional Classification

Roadway Functional Classification	Number of Traffic Count Locations	% RMSE	
		Model Compared to Observed	TN Guidelines (Small Region)
Freeways	42	14.3%	20%
Principal Arterials	74	23.0%	30%
Minor Arterials	125	40.3%	40%
Collectors	223	67.2%	70%
Total	464	34.9%	45%

Table 12-7 shows the %RMSE values by volume groups. Both measures are below the target values provided by TN Guidelines in all categories.

Table 12-7 Root Mean Square Error (RMSE) by Volume Group

Volume Group	Number of Traffic Count Locations	% RMSE	
		Model Compared to Observed	TN Guidelines (Targets)
< 5000	258	63%	100%
5000 - 10000	92	38%	45%
10000 - 15000	28	26%	35%
15000 - 20000	24	27%	30%
20000 - 30000	35	25%	27%
30000 - 50000	21	11%	25%
50000 - 60000	6	12%	20%
> 60000	0	0%	19%
Total	464	35%	45%

12.3 Screen Line and Cut Line Volumes

As a part of the model calibration and validation process, six screen lines were developed for the Johnson City model to gauge how well the model replicates traffic between different areas within the MPO area. **Figure 12-2** shows the screen line locations.

Table 12-8 shows the percent errors at screen lines. Five screen line and cut line fell within the desired targets. West, Northwest, and North cut lines are higher than counts by 16% to 21%. After careful examination of the locations with large errors, the Consultant believes that the following areas are the major contributing factors:

- Many zones in rural areas are very large. Modeled traffic volumes increase or decrease dramatically at centroid connector locations.
- Model is likely predicting longer trip length for external trips coming from Sullivan County (Kingsport and Bristol area).
- Model might be over-estimating trips out of these rural areas.

Gravity model K factors were applied to these directions during the model calibration effort. Without a local household travel survey, the Consultant decided to make only limited adjustments without over-calibrate the model. All three cut lines meet the FHWA Model Calibration and Validation Guidelines based on screenline/cutline total volumes.

Table 12-8 Volume-to-Count Percent Difference at Screen Lines / Cut Lines

Screen Line Name	Volume (VPD)		Number of Traffic Count Locations	% Difference		
	Observed (Traffic Counts)	Model Estimated		Model Compared to Observed	TN Guidelines (Targets)	FHWA Guidelines (Targets)
Downtown Cordon	287,934	285,732	28	-0.8%	10%	-
West	29,457	35,596	10	20.8%	15%	36%
North-West	78,875	89,631	8	13.6%	15%	26%
North	42,463	51,461	8	21.2%	15%	34%
East	17,420	18,914	3	8.6%	15%	-
South	39,400	43,001	9	9.1%	15%	-
Erwin	29,159	25,066	5	-14.0%	15%	-
Model Cordon	205,036	205,033	45	0.0%	1%	-

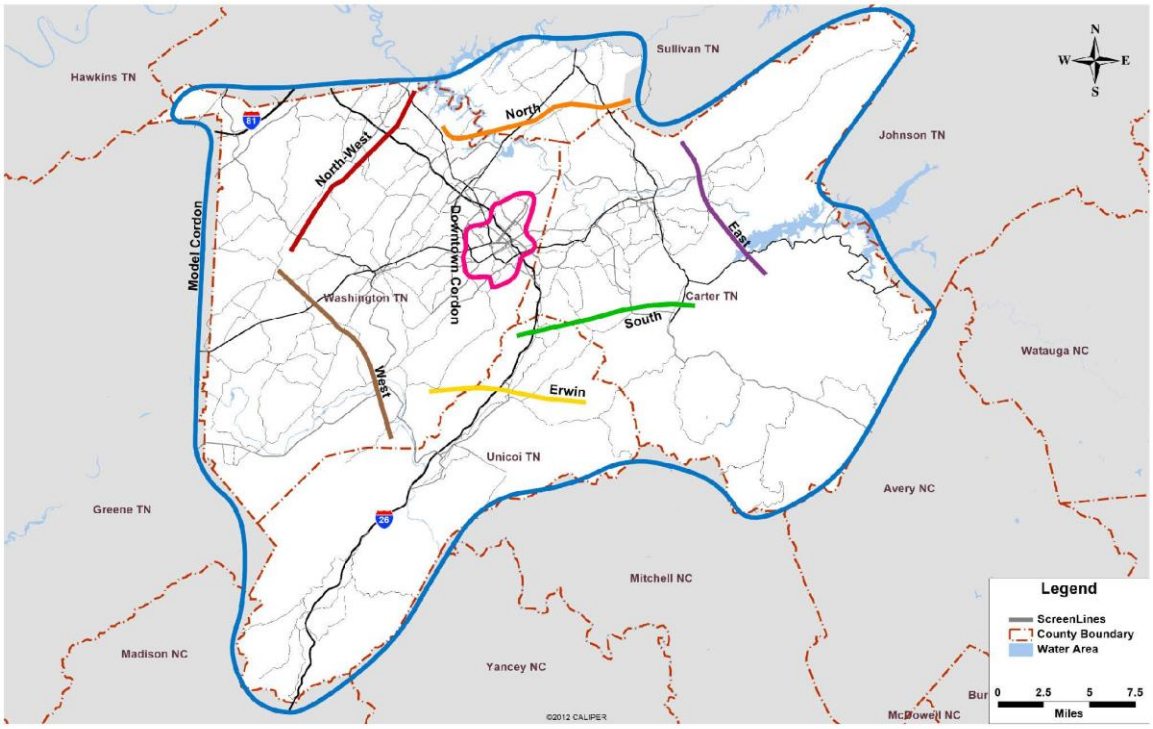


Figure 12-2 Screen Line Locations

12.4 Time-of-Day Period Measures

Table 12-9 compares the target counts with model assigned volumes for each time-of-day period. The daily total statistics reported here are different than the statistics reported in **Table 12-5** as not all traffic counts have time-of-day information. Overall, the % differences for all time-of-day periods are less than 5% compared with observed data. The time of day distribution from the model also closely matches the observed data. The results show that the model performs reasonably well in each time-of-day period at a system-wide level.

Table 12-9 Time-of-day Comparison

Time of Day Period	Volume (VPD)		Number of Traffic Count Locations	% Difference	Time-of-day Distribution	
	Observed (Traffic Counts)	Model Estimated			Observed (Traffic Counts)	Model Estimated
AM	432,533	432,784	463	0.1%	16.2%	16.2%
MD	957,627	969,071	462	1.2%	35.9%	36.2%
PM	636,230	629,596	462	-1.0%	23.8%	23.5%
OP	643,276	644,813	462	0.2%	24.1%	24.1%
Total	2,669,666	2,676,264	462	0.2%	100.0%	100.0%

Table 12-10 and **Table 12-11** show the percent of links within the range of count for AM and PM peak periods.

Table 12-10 Percent of Links within a Specified Percent of Count by Functional Classification - (AM Peak Period)

Roadway Functional Classification	Number of Traffic Count Locations	Error Range (+/-)	Percent Count within Range (AM)	TN Guidelines (Targets)
Freeway	20	20%	65%	75%
Freeway	20	10%	33%	50%
Major Arterial	48	30%	65%	75%
Major Arterial	48	15%	49%	50%
Minor Arterial	118	40%	61%	75%
Minor Arterial	118	20%	41%	50%

Table 12-11 Percent of Links within a Specified Percent of Count by Functional Classification - (PM Peak Period)

Roadway Functional Classification	Number of Traffic Count Locations	Error Range (+/-)	Percent Count within Range (PM)	TN Guidelines (Targets)
Freeway	20	20%	75%	75%
Freeway	20	10%	38%	50%
Major Arterial	48	30%	77%	75%
Major Arterial	48	15%	52%	50%
Minor Arterial	118	40%	73%	75%
Minor Arterial	118	20%	49%	50%

Table 12-10 and **Table 12-11** can be read as "75% of the freeway links need to be within 20% of counts, 50% of the freeway links need to be within 10% of counts".

12.5 Truck Traffic Reasonableness Check

Table 12-12 and **Table 12-13** compare the model and observed SU and CU truck volumes respectively by functional classification. These measures were calculated using only the count locations where vehicle classification information is available. Region wide, total trucks are roughly within 20% of the error margin. Although large variances are observed by facility type, the results are reasonable for QRFM based truck models.

Table 12-12 Volume-to-Count Percent Difference by Functional Classification for SU Trucks

Roadway Functional Classification	Truck Volume (VPD)		Number of Traffic Count Locations	Difference	
	Observed (Traffic Counts)	Model Estimated		Value	%
Freeways	7,282	7,726	20	444	6.1%
Principal Arterials	3,333	3,319	26	-14	-0.4%
Minor Arterials	5,346	4,570	51	-776	-14.5%
Collectors	2,006	1,862	82	-144	-7.2%
Total	17,967	17,476	179	-491	-2.7%

Table 12-13 Volume-to-Count Percent Difference by Functional Classification for CU Trucks

Roadway Functional Classification	Truck Volume (VPD)		Number of Traffic Count Locations	Difference	
	Observed (Traffic Counts)	Model Estimated		Value	%
Freeways	32,742	32,595	20	-147	-0.5%
Principal Arterials	5,240	5,704	26	464	8.9%
Minor Arterials	6,422	5,852	51	-570	-8.9%
Collectors	1,667	1,784	83	117	7.0%
Total	46,071	45,934	180	-137	-0.3%

CHAPTER 2 - FUTURE YEAR MODEL

13.0 DEMOGRAPHIC AND EMPLOYMENT FORECASTS FOR FUTURE YEARS

Future year data is the foundation upon which any successful travel demand forecasts are modeled. This section describes the process for allocating population and employment growth for model interim year 2025 and horizon year 2045.

13.1 Demographic Data

The same forecasting methodology and allocation processes used for the base year 2015 are applied for the horizon year of 2045. The Woods & Poole Data was used as county-level control totals for population within all four counties.

The process for determining the portion of each county's population that lies within the MTPO began with an analysis of 2010 US Census data. Using this data at the block geography as well as Woods & Poole county-level estimates, the percentage of each county's population within the MTPO area was determined. Those proportions were held constant for each county, and it was assumed that in future years, the same percentage of each county's population resided in the MTPO area as in 2010. The 2015 and future year population for each county in the MTPO area was then calculated using the Woods & Poole county population and those percentages. The results are shown in **Table 13-1**.

Table 13-1 County Population Within the Model Area

Counties	Year 2015	Year 2025	Year 2045
Carter	58,040	61,755	69,138
Sullivan	10,135	10,343	10,752
Unicoi	18,131	18,372	18,823
Washington	128,229	143,925	175,177
Total	**214,535**	**234,395**	**273,890**

For future horizon years (2025 and 2045), population growth was sub-allocated based on stakeholder input, as well as an examination of growth between 2000 to 2010 growth (by Census Block Group for the complete MTPO area). In addition to these variables, land availability and suitability were considered (looking at currently zoned residential, commercial, industrial and agricultural lands as well as lands classified as vacant by TAZ). Each of these factors were balanced to the control totals for population (for each county and each horizon year – 2025 and 2045).

Using the household control totals at the TAZ level, the cross-classification distribution from the base year was applied at the TAZ level to obtain the number of households in each cross-classification bin for each future year. The base year demographic cross-classification distribution is from the Census Transportation Planning Package 2010 (CTPP 2010) data set. The number of households were cross-classified to the following three categories:

- Household Size (number of persons) by vehicle ownership (number of vehicles owned per household),
- Household Size by number of children (age < 18) in household, and
- Number of workers in household by vehicle ownership.

Table 13-2 shows the forecasts of the total number of households for each future year and the percent growth from the base year of 2015.

Table 13-2 Future Year Population and Total Number of Households

Year	Population	No. of Households	% Growth (from 2015)
2015	214,535	99,671	-
2025	234,395	106,126	6.48%
2045	273,890	119,036	19.43%

Figure 13-1 shows the year 2045 household density in units of number of households (HH) per acre. **Figure 13-2** shows the percent growth and the total number of households from the model base year 2015 to horizon year 2045 for the 8 planning districts.

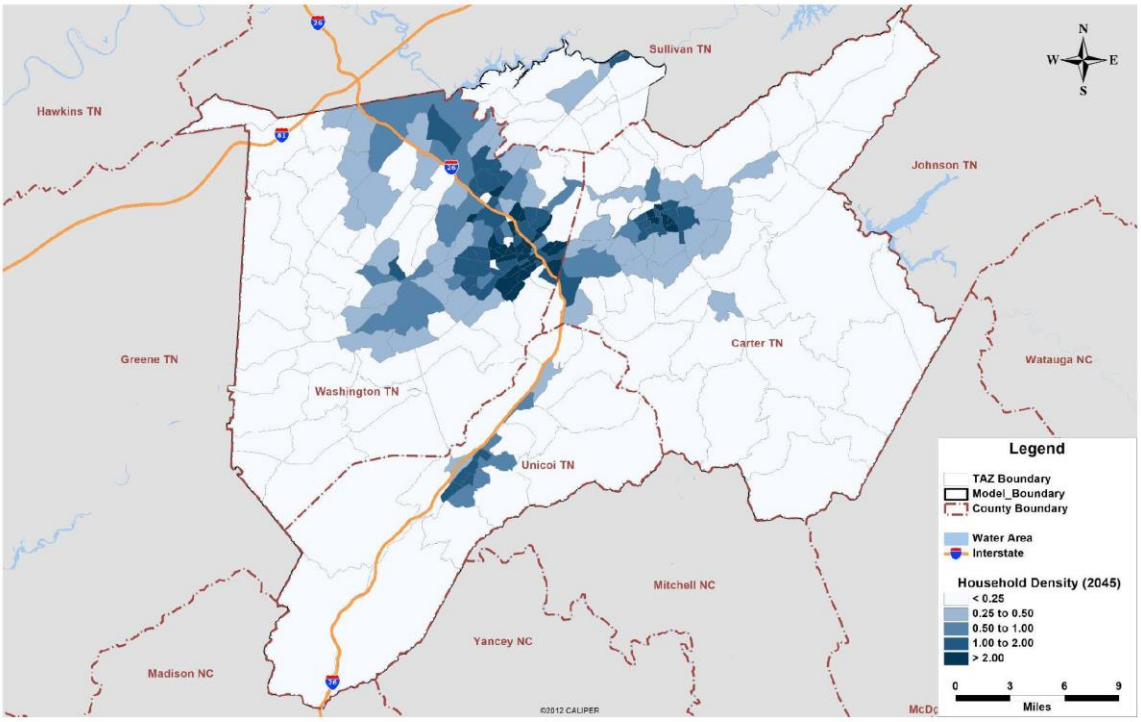


Figure 13-1 2045 Household Density (HH Per Acre)

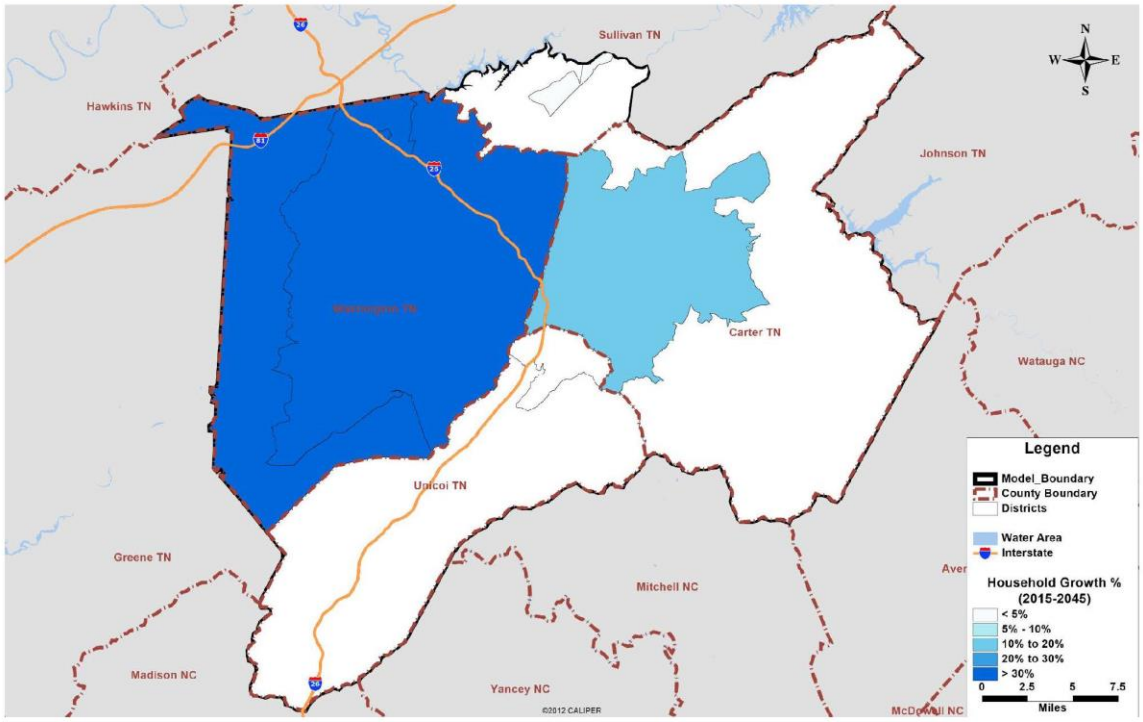


Figure 13-2 2045 Household Growth by Planning Districts

13.2 Employment Data

Based on the 2015 employment, county-specific growth rates established from the Woods & Poole data were used to project employment within the model area. Additionally, Woods & Poole data was used to determine the relative share of employment by employment classification for future years. For future years (2025 and 2045), employment growth was sub-allocated based on stakeholder input and an examination of growth between 2000 to 2010. In addition to these variables, land availability and suitability were considered by looking at currently zoned residential, commercial, industrial and agricultural lands as well as lands classified as vacant by TAZ. Each of these factors were balanced to the control totals for employment for each county as well as for each job classification – agricultural, manufacturing, retail, office, service, and government employment – and by horizon year 2025 and 2045.

Table 13-3 summarizes the forecasts of the total employment for each future year and the percent growth from the base year of 2015.

Table 13-3 Future Year Total Employment

Year	Total Employment	% Growth (from 2015)
2015	91,206	-
2025	106,151	10.30%
2045	136,054	25.70%

Figure 13-3 shows the employment density in total employment per acre by TAZ for year 2045. **Figure 13-4** shows the percent growth in total employment from the model base year 2015 to horizon year 2045 for the 8 planning districts.

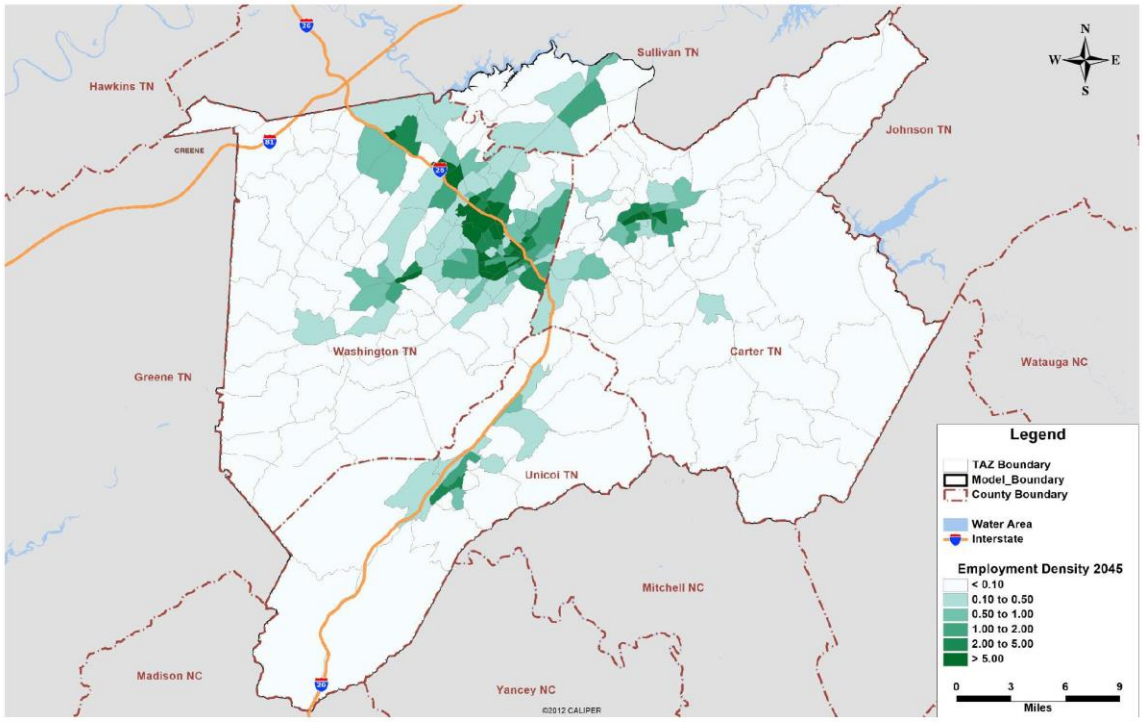


Figure 13-3 2045 Employment Density (Employment Per Acre)

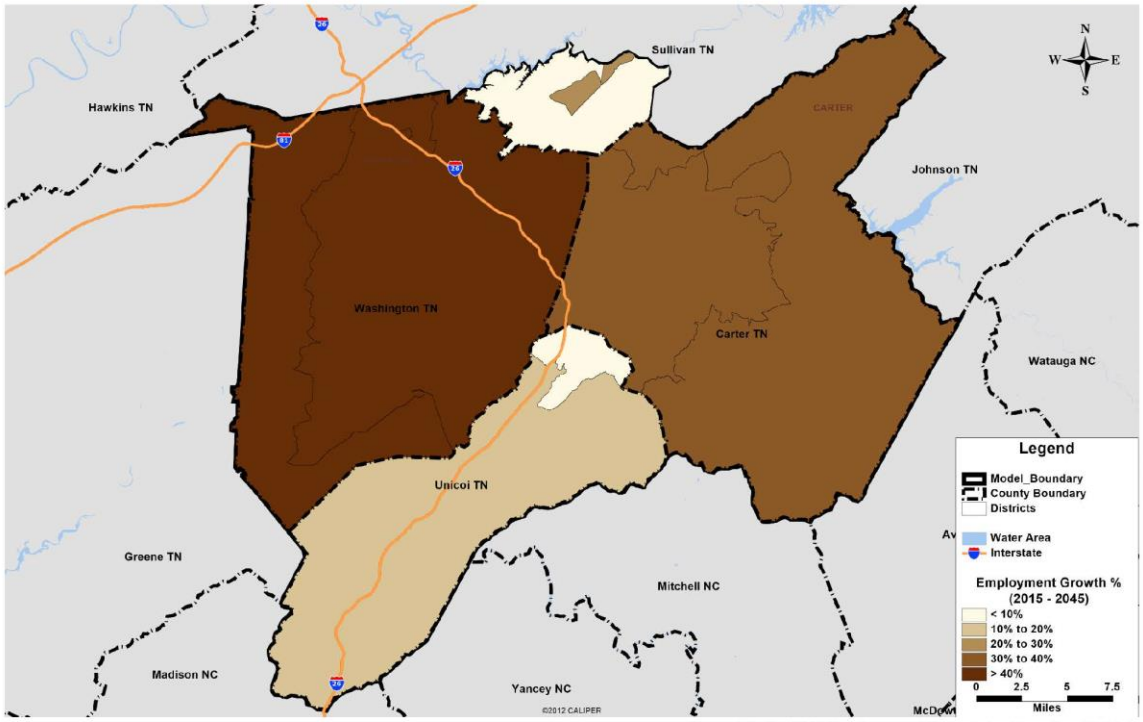


Figure 13-4 2045 Employment Growth by Planning Districts

13.3 School and College Enrollment

School and college enrollment forecasts are based on current per capita measures in each TAZ, and increased according to projected population growth. When possible, projected growth rates provided by individual school districts have been considered in the forecasted student and college enrollments. **Table 13-4** summarizes the forecasts of the school enrollment for each future year and the percent growth from the base year of 2015.

Table 13-4 Future Year School Enrollment

Year	K-12 School Enrollment	K-12 School % Growth (from 2015)	College Enrollment	College % Growth (from 2015)
2015	29,379	-	14,260	-
2025	32,056	10.30%	15,979	10.30%
2045	37,688	25.70%	19,476	25.70%

14.0 EXTERNAL TRIP FORECASTS

While internal trips are estimated by the model based on trip rates and the forecasted housing and employment, external trips must be forecasted manually. External trips are treated as model input. All growth rates developed for external stations are exponential growth rates. The following information was developed and used for forecasting external station trips.

- Annual growth rates at external stations from the Tennessee Statewide Model
- Annual growth rates based on historic traffic counts from 1995 to 2015 collected from TDOT and VDOT
- Average historic growth rates at external stations by roadway functional classification.

If historic counts at an external station were available, two annual growth rates were calculated: 1995-2015 representing a long-term trend, and 2005-2015 representing a shorter-term trend. The two growth rates were averaged, and the growth rates by functional classification were calculated. A 0.5% growth rate was used for low volume collector and local roads without sufficient historic data. In addition, if links are modeled in the Tennessee Statewide Model, annual growth rates were calculated and referenced when determining the growth rate. **Table 14-1** lists the forecasted future year Average Daily Traffic (ADT) at external stations.

The number of future year vehicle trips at each external station was set equal to the forecasted ADT at the station. The external trips were applied in the model using the same methodology described in previous chapter. The following input data in the base year model were assumed to hold true for future years:

- Vehicle classification splits (Auto, SU truck, and CU truck)
- EE/EI splits
- Time-of-day splits
- In-bound and out-bound splits
- K-factors used for the EE gravity models.

Table 3-1 Future Year External Station ADTs

ID	Name	State	Func. Class	2015 ADT	Growth Rate	2025 ADT	2045 ADT
501	Horton Hwy	TN	8	677	0.50%	712	786
502	I-81	TN	1	26,170	0.98%	28849	35059
503	Jearoldstown Rd	TN	8	1,000	0.50%	1051	1161
504	Highway 93	TN	6	1,500	3.14%	2043	3791
505	Old Ducktown Rd	TN	8	118	0.50%	124	137
506	Milburnton Rd	TN	8	337	0.50%	354	391
507	Bowmantown Rd	TN	8	1,000	0.50%	1051	1161
508	Highway 11E	TN	2	12,172	0.50%	12791	14127
509	SR 107	TN	6	4,487	1.30%	5105	6608
510	SR 352	NC	7	270	0.50%	284	314
511	I-26	NC	1	8,800	2.23%	10974	17065
512	Highway 19W	NC	7	110	0.96%	121	146
513	Rock Creek Rd	NC	7	270	0.50%	284	314
514	Unicoi Dr	NC	7	860	1.15%	964	1212
515	Hughes Gap Rd	NC	8	677	0.50%	662	732
516	SR 143	NC	7	90	0.50%	95	105
517	Highway 19E	NC	6	4,762	2.23%	5938	9234
518	Buck Mtn Rd	NC	8	250	0.50%	263	290
519	Poga Rd	NC	8	185	0.50%	194	215
520	Highway 321	TN	2	1,003	1.17%	1127	1422
521	Buntontown Rd	TN	8	170	0.50%	179	197
522	SR 67	TN	6	3,880	1.08%	4322	5362
523	SR 91	TN	7	581	0.50%	611	675
524	Rockhold Rd	TN	7	1,795	2.31%	2257	3566
525	Highway 390	TN	17	4,970	0.50%	5224	5772
526	Highway 11E	TN	14	22,488	0.82%	24413	28773
527	Enterprise Rd	TN	17	1,293	0.50%	1359	1502
528	Devault Bridge Rd	TN	8	1,624	0.93%	1782	2144
529	Highway 75	TN	16	8,946	1.90%	10799	15736
530	Fort Henry Dr	TN	14	9,276	1.36%	10622	13928
531	Liberty Church Rd	TN	17	1,100	3.02%	1482	2689
532	Old Fordtown Rd	TN	17	207	0.50%	218	240
533	Eastern Star Rd	TN	17	2,532	0.88%	2763	3290
534	I-26	TN	11	49,244	0.67%	52648	60178
535	Fordtown Rd	TN	17	1,184	2.27%	1482	2323
536	I-81	TN	11	25,766	0.53%	27164	30191
537	Rock Spring Rd	TN	17	677	0.50%	712	786
538	Mill Creek Rd	TN	8	474	0.50%	498	551
539	Highway 93	TN	2	4,091	4.26%	6209	14302

15.0 FUTURE YEAR HIGHWAY NETWORK DEVELOPMENT

Development of the future year highway network includes identifying the future year projects and coding the projects based on the location and improvement type. In the Johnson City model, a master network and project table approach is used to organize the future year network improvements. This approach greatly simplifies the future year scenario management.

15.1 Master Network and Project Table Methodology

In the Johnson City model, a single master network is used for the base year and all future year models. In TransCAD, the line layer is not the actual model network used by the travel demand modeling system. Rather, the model network is built from the line layer. This means the model network is developed as a selection set from the line layer. Having a selection set means that highway, transit, and walk networks can use a different subset of the entire street network system. An attribute named "In Network" in the line layer is used to identify the links to be included in the model's highway network building process.

All future year highway projects were stored in a project table. For facilities on new location, links were developed for future year roads and added to the master network database as new links. Attributes for the new facilities in the future year were added to the project table. For widening projects, the number of lanes and other improvements such as signalization will be identified in the project table. Similarly, other types of projects such as changing speed limit, changing functional classification, and adding or removing on-street parking can be modeled using this approach.

The project table also identifies the years and scenarios in which the project is expected to be built. During the model initialization step, based on the analysis year and network alternative selected in the current scenario, the model will go through the projects in the project table and only incorporate the active projects based on their born year and associated network alternatives.

This methodology allows a single database to handle all potential projects in the highway network in a compact format. One project can be easily included in multiple scenarios, and can be switched on and off with a simple click. It significantly reduces model maintenance burden and potential errors or inconsistencies for project coding.

To facilitate project coding, a "Future Year Project" toolbox was developed for the Johnson City model. **Figure 15-1** shows the project editor interface of this tool. The benefits of using this toolbox to code the project include querying links to see all the associated projects, modifying or deleting a project, and adding a new project with intuitive workflow. Details on how to use the "Future Year Project" toolbox will be provided in the Model User's Manual.

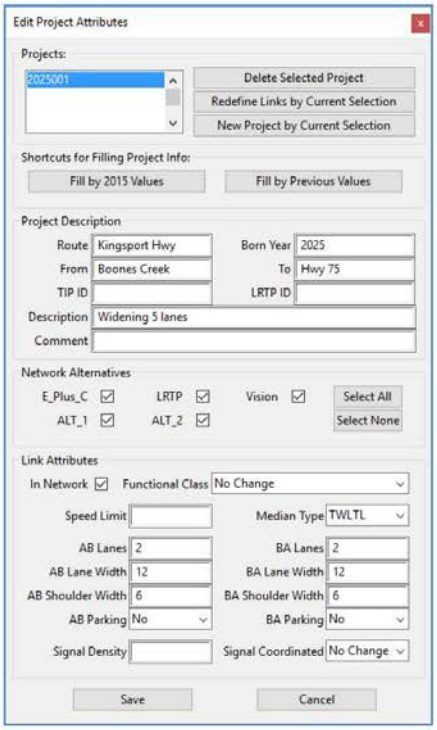


Figure 15-1 Project Editing Tool Box

15.2 Existing Plus Committed Network

The Existing Plus Committed (E+C) highway network was developed using the master network and project table methodology described above. The E+C network alternative includes the improvements that were completed between 2015 and 2016 and projects that are to be completed by 2025. **Table 15-2** shows the projects included in the E+C network alternative. While there are additional projects included in the E+C list contained in the Long-Range Transportation Plan, the projects in **Table 15-2** are the only projects impacting the travel demand model.

Table 15-2 Existing and Committed Projects

ID	Name	Termini	Description
1	Kingsport Hwy (SR 36)	SR 354 (Boone Avenue) to SR 75	Widen from 2 lanes to 5 lanes
2	Gap Creek Road (SR 362)	SR 67 to SR 361	Reconstruct and Widen - 2 and 3 lanes
3	SR 75	SR 36 to SR 357	Widen from 2 lanes to 5 lanes
4	I-26 Exit 13 (SR 75)	Exit 13 on I-26 (SR 75/ Suncrest Drive/ Bobby Hicks Highway @ I-26)	Interchange modification
5	SR 91 and SR 67 Signals	Judge Ben Allen Road @ SR 91; SR 67 @ Williams Avenue in Elizabethton	Install new traffic signals at intersections in Elizabethton
6	VA Hospital Connector	West Market Street to VA Hospital	Construct new 2-lane road
7	Knob Creek Road Extension	West of Mizpah Hills Drive to Marketplace Boulevard	Construct a new 5 lane (overpass crossing CSX RR)

16.0 YEAR 2045 E+C MODEL RESULTS

A full model run was conducted using the future year 2045 demographic and employment forecasts and the E+C network alternative. This section summarizes the highway assignment results from the 2045 E+C scenario.

For highway assignment results, the 2045 Vehicle Miles of Travel (VMT) are summarized by roadway functional classification and districts and compared with the base year 2015 results. Model predicted traffic volumes crossing screen lines and cut lines are compared with the base year 2015 results.

VMT Region Wide

Table 16-1 shows a comparison of the base year 2015 and 2045 average VMT per capita and per household estimated by the model. **Table 16-2** compares the 2045 VMT by functional classification with 2015. The 2045 model predicted VMT per capita of 25 and VMT per household of 57.7. Overall, the regional VMT increased by 22.6% from 2015 to 2045.

Table 16-1 2045 VMT per Person and Household

	2015 Model	2045 Model
VMT per Person	25.7	25.0
VMT per Household	55.3	57.6

Table 16-2 2045 Model Predicted VMT Compared with 2015 by Functional Classification

Roadway Functional Classification	Model Estimated VMT		% Difference	VMT Distribution	
	2015	2045		2015	2045
Freeways	635,763	775,706	21.8%	27.0%	27.0%
Principal Arterials	809,293	970,831	20.2%	31.9%	30.8%
Minor Arterials	811,769	1,012,837	23.7%	24.7%	25.2%
Collectors	427,851	536,285	26.4%	16.4%	17.0%
Total	2,684,676	3,295,659	**22.6%**	100.0%	100.0%

VMT by Districts

Table 16-3 shows a summary of the year 2045 model VMT at a district level using the 8 planning districts defined in the model validation process.

Estimated Traffic at Screen Lines/Cut Lines

Table 16-4 shows the year 2045 predicted traffic volumes at the screen lines and cut lines.

Table 16-3 District VMT Results Comparison

District Name	VMT		% Difference
	2015	2045	
Washington Inside MPA	2,363,653	2,973,961	25.8%
Washington Outside MPA	487,694	644,625	32.2%
Unicoi Inside MPA	71,203	80,104	12.5%
Unicoi Outside MPA	405,911	566,179	39.5%
Carter Inside MPA	762,413	841,026	10.3%
Carter Outside MPA	365,151	451,876	23.8%
Sullivan Inside MPA	63,958	83,020	29.8%
Sullivan Outside MPA	167,614	191,474	14.2%

Table 16-4 Estimated Traffic Volume at Screen Lines / Cut Lines

Screen Line / Cut Line Name	Model Predicted Volume Per Day		% Difference
	2015	2045	
Downtown Cordon	285,732	329,066	15.2%
West	35,596	43,472	22.1%
North-West	89,631	115,389	28.7%
North	51,461	59,072	14.8%
East	18,914	22,117	16.9%
South	43,001	49,319	14.7%
Erwin	25,066	29,997	19.7%
Model Cordon	205,033	286,473	39.7%

Estimated Congestion Hot-spots and Level of Service (LOS)

The level of service (LOS) for roadways was developed based on the 2045 E+C model results. The level of service is categorized as the following four levels based on the volume to capacity ratio (V/C ratio) at the daily level:

- LOS F: V/C Ratio ≥ 1.0
- LOS E: 0.85 ≤ V/C Ratio < 1.0
- LOS D: 0.7 ≤ V/C Ratio < 0.85
- LOS C or Better: V/C Ratio < 0.7

For comparison purposes, the LOS map based on the 2015 base year model is shown in **Figure 16-1**. **Figure 16-2** shows the level of service based on the 2045 E+C model run.

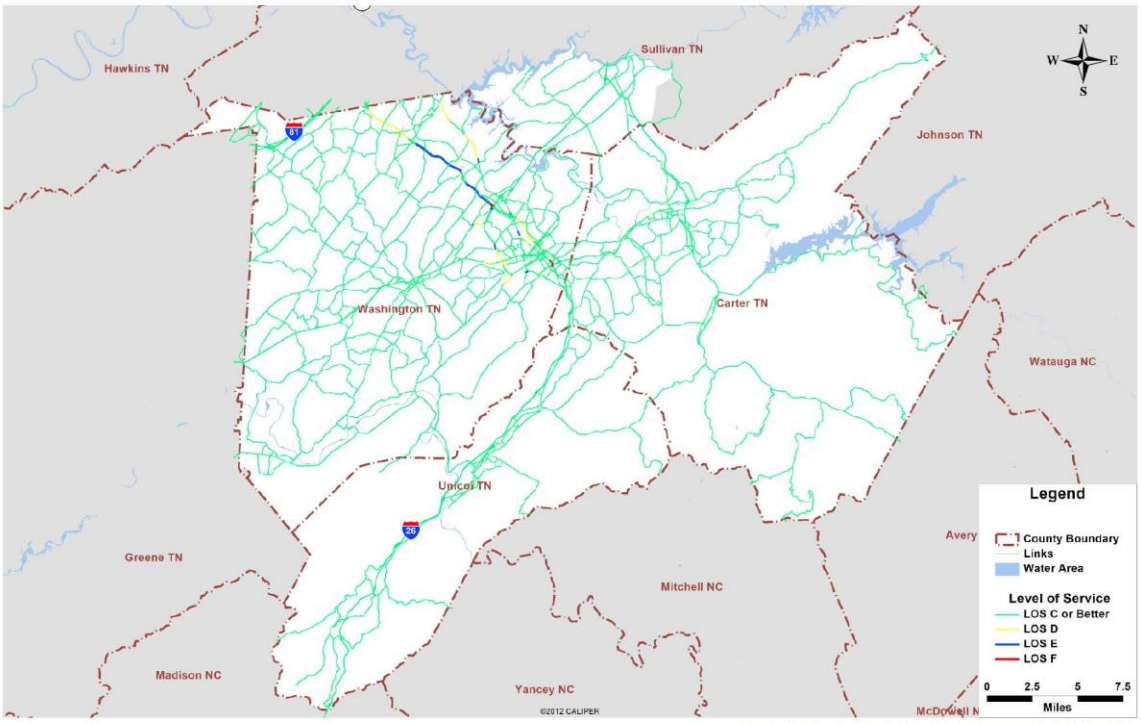


Figure 16-1 2015 Highway Network Level of Service

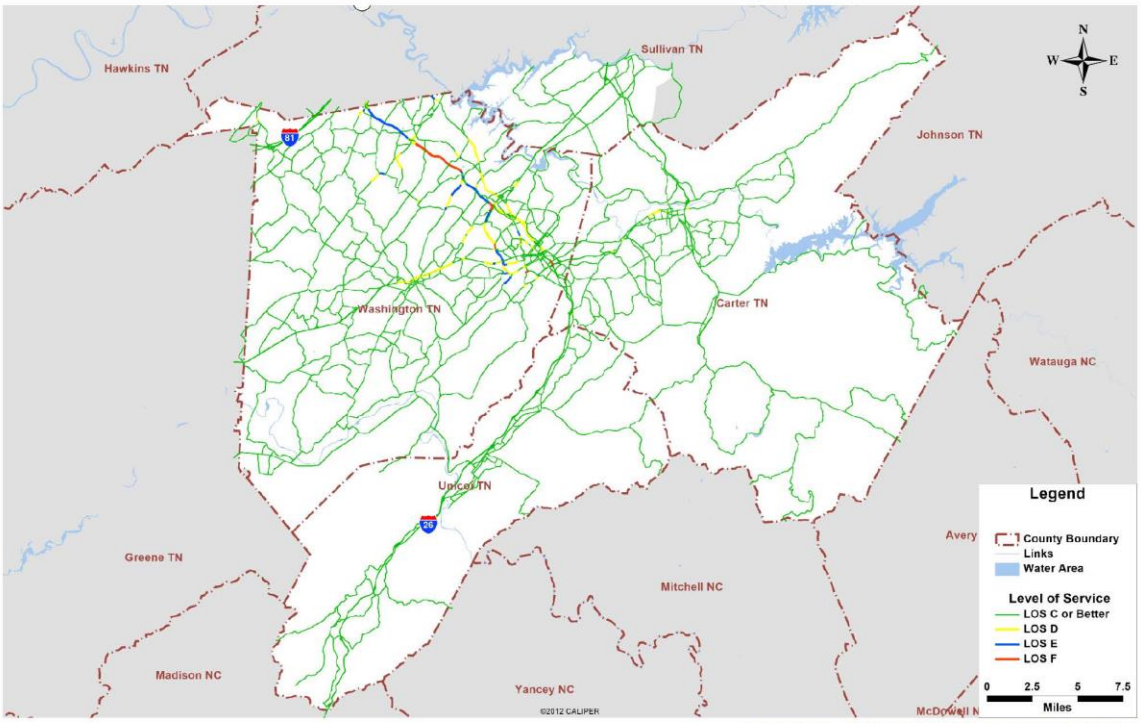


Figure 16-2 2045 Highway Network Level of Service

APPENDIX IV – Project Prioritization

Scored Candidate Projects Considered in the 2045 MTP

ID	ROADNAME	Description	TERMINI	Length	Safety	Operational Efficiency	Active Transportation	Environmental	Economic	TOTAL
1	I-26	Widen existing 4 lane interstate to 6 lanes	I-81 to SR 75	3.66	12	20	0	4	15	51
2	I-26	Widen existing 4 lane interstate to 6 lanes	SR 75 to SR 354	3.74	12	17	1	4	15	49
3	I-26	Widen existing 4 lane interstate to 6 lanes	SR 354 to N Roan St (US11E)	3.42	12	20	3	4	15	54
4	I-26	Widen existing 4 lane interstate to 6 lanes	N Roan St (US11E) to US 321	3.65	12	15	3	4	15	49
5	Boones Ck Rd (SR354)	Widen existing 2 lane roadway to 4 lanes	I-26 to Highland Church Rd	2.20	8	17	11	4	13	53
6	Boones Ck Rd (SR354)	Widen existing 2 lane roadway to 4 lanes	Highland Church Rd to Jonesborough Bypass	2.90	6	17	5	4	2	34
7	Boones Ck Rd (SR354)	Widen existing 2 lane roadway to 4 lanes	Jonesborough Bypass to US 11E	1.21	11	17	8	4	7	47
8	Jonesborough Bypass	Construct new 3 lane roadway	Boones Ck Rd (SR354) to US 11E (Persimmon Ridge Rd)	2.71	11	19	3	5	4	42
9	N. State of Franklin	Widen existing 4 lane roadway to 6 lanes	I-26 to Knob Creek Rd	1.00	15	20	8	3	13	59
10	N. State of Franklin	Widen existing 4 lane roadway to 6 lanes	Knob Creek Rd to Indian Ridge Rd	1.89	15	17	8	4	7	51
11	Elk Ave/Broad St (SR 67)	Widen existing 4/5 lane roadway to 6 lanes	Hudson Dr to Lynn Ave (SR 400)	1.38	25	10	10	4	7	56
12	Bristol Hwy (SR34)	Widen existing 4/5 lane roadway to 6/7 lanes	SR 381 to MTPO Planning Boundary	3.06	12	14	8	3	9	46
13	Bristol Hwy (SR34)	Widen existing 4 lane roadway to 6/7 lanes	MTPO Planning Boundary to US 19E	4.49	10	15	3	4	8	40
14	Roy Martin Rd	Reconstruct 2 lane roadway addressing geometric issues to align with Roy Martin Rd Ext	Gray Station Rd to SR75 (Bobby Hicks Hwy)	0.21	2	12	1	10	9	34
15	Roy Martin Rd Ext	Construct new 2 lane roadway	SR75 Bobby Hicks Hwy to Free Hill Rd	0.98	2	12	1	4	9	28
16	Free Hill Rd	Reconstruct 2 lane roadway addressing geometric issues	Free Hill Rd to SR 36 (Kingsport Hwy)	1.58	2	12	1	9	4	28
17	Knob Creek Rd	Widen existing 2 lane roadway to 4 lanes	Mizpath Hills Dr to SR 354	1.98	9	17	0	3	4	33
18	W. G St	Reconstruct existing 2 lane roadway to 3 lanes (adding a center turn lane)	W Elk Ave (SR 67) to Hudson Dr	1.95	22	12	6	8	8	56
19	Watauga Rd (SR 400)	Reconstruct existing 2 lane roadway to 3 lanes (adding a center turn lane)	Broadway St to E Fairview Ave	1.14	11	17	15	8	5	56
20	Watauga Rd (SR 400)	Reconstruct existing 2 lane roadway to 3 lanes (adding a center turn lane)	E Fairview Ave to Piney Flats Rd	2.79	11	17	15	8	5	56
21	Bob Jobe Rd Ext	Reconstruct 2 lane roadway addressing geometric issues to align with Bob Jobe Rd Ext	Eastern Star Rd (Bob Jobe Rd) to Ford Creek Rd	1.51	2	12	0	9	4	27
22	Bob Jobe Rd Ext	Construct new 2 lane roadway	Ford Creek Rd to Center St	1.47	2	12	3	4	1	22
23	Hopper Rd	Reconstruct 2 lane roadway addressing geometric issues to align with Hopper Rd Ext	US 11E (W Market St) to Indian Ridge Rd	0.65	2	5	8	10	1	26
24	Hopper Rd Ext	Construct new 2 lane roadway	Indian Ridge Rd to Claude Simmons Rd	0.98	2	5	5	4	1	17
25	Okolona Rd (SR 359)	Realign existing roadway with interchange to create better access	I-26 to existing Okolona Rd (SR 359)	0.71	2	17	0	4	8	31
26	SR 75	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	US 11E to Boonesboro Rd	12.81	15	14	8	9	7	53
27	SR 81	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	I-81 to Jonesborough Bypass	14.44	15	14	6	8	8	51
28	Leesburg Rd	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	US 11E to SR 81	3.86	4	10	1	10	2	27
29	SR 353	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	SR 81 to SR 107	13.32	15	12	4	8	8	47
30	SR 81	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	SR 353 to I-26	13.78	19	12	8	8	8	55
31	SR 361	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	SR 359 to US 19E	8.88	15	10	5	8	4	42
32	Okolona Rd (SR 359)	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	Milligan Hwy to S Roan St	1.64	11	2	9	8	5	35
33	Highland Church Rd	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	SR 75 to Boones Ck Rd (SR 354)	5.28	11	14	0	8	12	45

Appendix V - Title VI and Environmental Justice Assessment

The specific civil rights concerns with transportation projects revolve around Title VI of the Civil Rights Act and Environmental Justice requirements (E.O.12898 *Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations*). US DOT's policy is to ensure compliance with 42 U.S.C. 2000 "No person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under a program or activity receiving federal financial assistance from the Department of Transportation." E.O. 12898 requires each agency (including the US DOT) to "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations". US DOT issued its Order on Environmental Justice (DOT Order 5610.2) in response to clarify Title VI responsibilities. Adverse impacts related to transportation projects include:

- Bodily impairment, infirmity, illness, or death.
- Air, noise, and water pollution; and soil contamination.
- Destruction or disruption of man-made or natural resources.
- Destruction or diminution of aesthetic values.
- Destruction or disruption of community cohesion or a community's economic vitality.
- Destruction or disruption of the availability of public and private facilities and services.
- Vibration.
- Adverse employment effects.
- Displacement of persons, businesses, farms, or nonprofit organizations.
- Increased traffic congestion, isolation, exclusion, or separation of minority or low-income individuals within a given community or from the broader community.
- The denial of, reduction in, or significant delay in the receipt of benefits of DOT programs, policies, or activities.

The DOT Order ensures that there will be greater public involvement opportunities and access to information on transportation activities affecting the human health and the environment. A requirement of the E.O. 12898 and the DOT Order concerns Limited English Proficiency (LEP) people. Discrimination against people who are Limited English Proficient was determined to be a form of national origin discrimination forbidden by Title VI of the Civil Rights Act.

Metropolitan planning organizations are required to consider three fundamental environmental justice principles:

1. To avoid, minimize, or mitigate disproportionately high and adverse human health and environmental effects, including interrelated social and economic effects, on minority populations and low-income populations.
2. To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process.
3. To prevent the denial of, reduction in, or significant delay in the receipt of

benefits by minority populations and low-income populations.

Metropolitan planning organizations are required to consider environmental justice early in the planning process and (1) determine benefits to and potential negative impacts on minority populations and low-income populations from proposed investments or actions; (2) quantify expected effects (total, positive and negative) and disproportionately high and adverse effects on minority populations and low-income populations; and (3) determine the appropriate course of action, whether avoidance, minimization, or mitigation. (This is a discussion of environmental justice and planning, but the requirements apply across the whole range of transportation activities including contracting for services, and require the recipients, i.e. the MTPO, and the urbanized areas in Sullivan, Washington, Carter, and Unicoi Counties, to do things such as monitor minority participation in contracts and maintain a complaint system for addressing Title VI complaints, etc.).

The following sections provide an assessment of potential impacts to the low-income and minority population groups within the Johnson City Metropolitan Transportation Planning Organization (MTPO) area based on implementation of the transportation projects within the 2045 Metropolitan Transportation Plan (MTP). The analysis was done using the MTPO's geographic information system (GIS) and US Census Block Group data. The 5- Year Estimate (2009-2013) US Census American Community Survey (ACS) Population and Housing Characteristics data were used for this assessment with data being used at the US Census Block Group level. A senior population analysis (persons over the age of 65) was also undertaken given the size of this population group in the MTPO area and their vulnerability over time to transportation decisions (i.e. availability of income to transportation costs, mobility limitations, etc.).

Minority Population

According to the 2009-2013 ACS data, approximately 7% of the Johnson City MTPO region's residents are considered to be minorities (non-white). As shown in Table 1, the region's minority population is comparable to those of Carter, Sullivan, Washington, and Unicoi counties in the MTPO area. When compared with the share of minority population for Tennessee, the MTPO's share of minority population is considerably smaller. It should be noted that the populations shown in this table are based on ACS estimates and therefore may not align with the existing population in 2015 detailed in the MTP document.

Table 1: Johnson City MTPO Area Minority Population

	Total Population	Minority (Non-White)	Percent Minority
Johnson City MTPO	161,359	11,131	7%
Carter County *	57,438	2,229	4%
Sullivan County*	156,741	8,084	5%
Washington County*	123,891	9,330	8%
Unicoi County*	18,254	489	3%
Tennessee	6,402,387	1,395,373	22%

Source: ACS 5-Year Estimate, US Census, 2014

*Total county populations were used for these categories

In the following subsections, the positive and negative effects of the 2045 MTP's highway, transit, and bicycle/pedestrian improvements on concentrations of minority populations are discussed by type of improvement. The highway projects (both funded and unfunded) in the 2045 MTP include roadway widening projects, new roadways, reconstruction of roadways, signal improvements, and intersection improvements. In some cases, sidewalks and/or bicycle facilities may be included as part of a highway project and are noted in the analysis. Additionally, expansion in transit services and routes in areas with concentrations of minority, senior, and low-income populations will have positive impacts on the transportation system in these areas.

HIGHWAY IMPROVEMENTS

There are a total of 59 Census Block Groups within the Johnson City MTPO area that will be directly affected by the 2045 MTP highway transportation improvement projects. Of the total MTPO Population estimated by the ACS data (161,359 people), the share within the affected Census Block Groups is 59% and the share of the total MTPO minority population (11,131 people) is 54%. Within the 59 Census Block Groups, a total of 95,167 people reside, of which 6% are minority, as seen in Table 2.

Table 2: Characteristics of All Census Block Groups with Highway Improvements

Within	Number of Block Groups	Number of People	Total Block Group Population (%)	Total MTPO Population	Total MTPO Population (%)
Non-Minority	59	89,150	94%	150,228	59%
Minority		6,017	6%	11,131	54%
All		95,167	100%	161,359	59%

Source: ACS 5-Year Estimate, US Census, 2014

The next step was to look at the Census Block Groups within the affected area (the 59 Block Group area) in which the share of minority population is higher than the MTPO region's percentage of minority population (7%). Of the 59 Block Group affected area, 22 Block Groups have over 7% minority population (See Table 3 and Figure 1).

For the purposes of this EJ analysis, those individual Block Groups where the share of minority population is double that of the MTPO area (or 14% minority or higher) are considered to potentially contain an environmental justice population and are referred to as "communities of concern". Eight Census Block Groups are part of the "communities of concern". A total of 2,337 minority people reside in those eight Block

Groups, representing about 21% of the total number of minority people in the MTPO area (11,131 people). All but one of these eight Block Groups are located in Washington County.

Table 3: Minority Census Block Groups with Highway Improvements

Within	Number of Block Groups	Number Minority Population	Percent of MTPO Minority Population
Minority – At Least Regional Average (7% to 14%)	14	1,998	18%
Minority – Double Average (14% or Greater) – "Communities of Concern"	8	2,337	21%

Source: ACS 5-Year Estimate, US Census, 2014

A more detailed review, including positive and negative impacts of the projects in the communities of concern was conducted. The projects' affects include improving traffic congestion, adding transportation options by including bicycle and pedestrian modes, improving access to transit, and possibly affecting right-of-way due to new roadways, roadway widening, or reconstruction.

The highway projects in the 2045 MTP that would fall within the minority population of at least 7% were identified. Eighteen improvements fall into this category consisting of new roadways and roadway widenings; roadway reconstructions and realignments; bridge replacements and rehabilitations; interchange ramp improvements; signal and intersection improvements; and safety-related projects. The signal and intersection improvements should improve the traffic flow in the areas. Also, the safety improvements should improve the transportation network so these projects would have a positive impact on the population. The improvements to bridges and interchanges are primarily related to safety, not capacity. That leaves the road widening and new construction projects which may adversely affect the population and require mitigation steps be taken. These 18 projects are listed in Table 4 with project descriptions and funding year.

Figure 1
Highway Improvements in Minority Population Areas

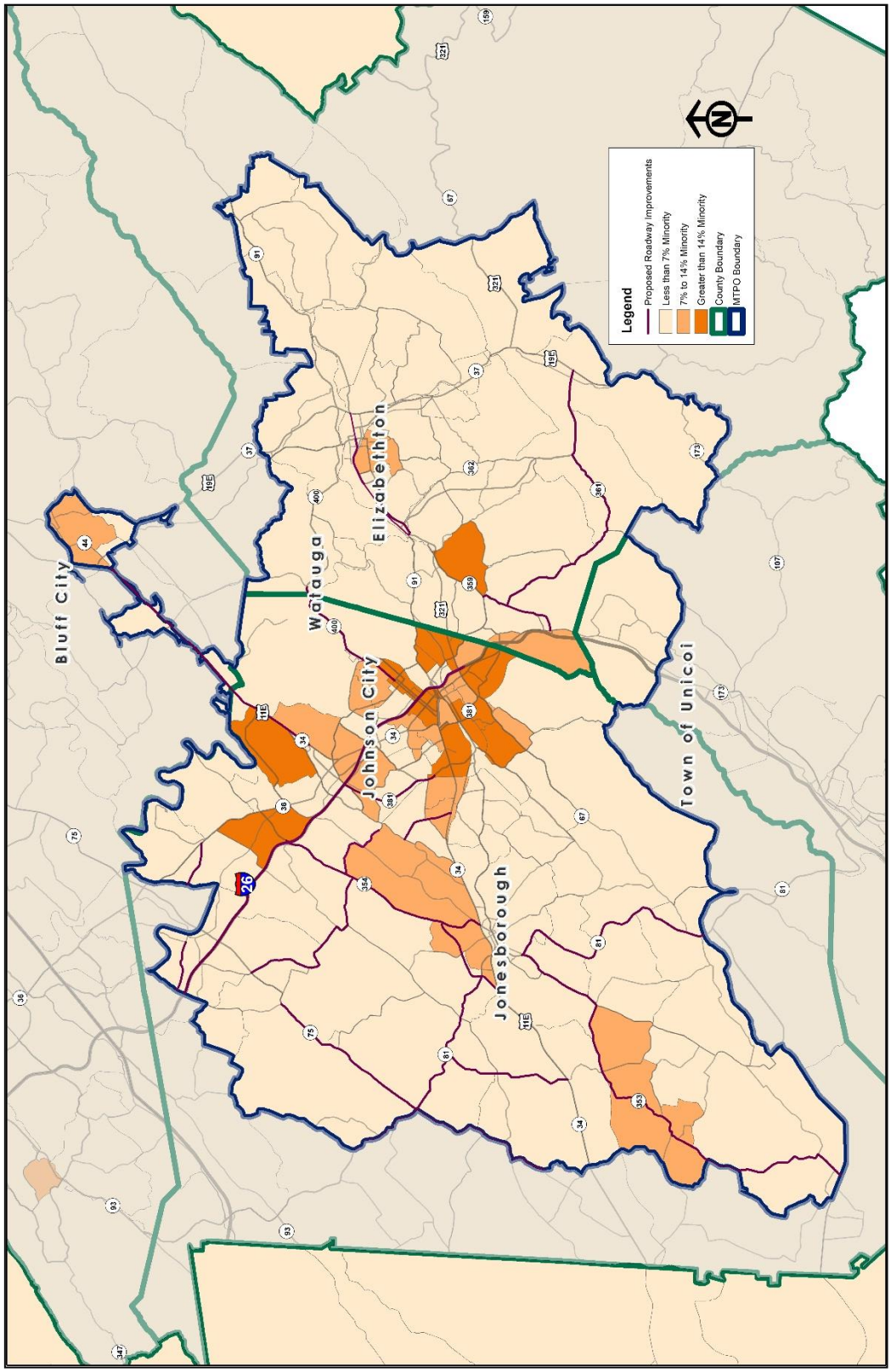


Table 4: Highway Improvements within Block Groups containing Greater than 7% Minority

2045 MTP #	Jurisdiction	Roadway	From	To	Length Miles	Federal Functional Class	Type of Improvement	Project Description	Horizon Year
2	Johnson City	I-26	Bobby Hicks Hwy (SR 75)	Boones Creek Rd (SR 354)	3.7	Interstate	Widening	Widen existing 4 lane interstate to 6 lanes	Illustrative
3	Johnson City	I-26	Boones Creek Rd (SR 354)	N Roan St (US11E)	3.4	Interstate	Widening	Widen existing 4 lane interstate to 6 lanes	Illustrative
4	Johnson City	I-26	N Roan St (US11E)	US 321	3.7	Interstate	Widening	Widen existing 4 lane interstate to 6 lanes	Illustrative
5	Johnson City	Boones Creek Rd (SR 354)	I-26	Highland Church Rd	2.2	Minor Arterial	Widening	Widen existing 2 lane roadway to 4 lanes	2045
6	Washington Co	Boones Creek Rd (SR 354)	Highland Church Rd	Jonesborough Bypass	2.9	Minor Arterial	Widening	Widen existing 2 lane roadway to 4 lanes	2045
7	Jonesborough	Boones Creek Rd (SR 354)	Jonesborough Bypass	US 11E	1.2	Minor Arterial	Widening	Widen existing 2 lane roadway to 4 lanes	2045
8	Jonesborough	Jonesborough Bypass	Boones Creek Rd (SR 354)	US 11E (Persimmon Ridge Road)	2.7	Proposed Minor Arterial	New Road	Construct new 3 lane roadway	2025
9	Johnson City	N. State of Franklin (SR 381)	I-26	Knob Creek Rd	1	Principal Arterial	Widening	Widen existing 4 lane roadway to 6 lanes	2045
10	Johnson City	N. State of Franklin (SR 381)	Knob Creek Rd	Indian Ridge Rd	1.9	Principal Arterial	Widening	Widen existing 4 lane roadway to 6 lanes	Illustrative
12	Johnson City	Bristol Hwy (SR 34)	N. State of Franklin (SR 381)	Washington/Sullivan Co. Line	3.1	Principal Arterial	Widening	Widen existing 4/5 lane roadway to 6/7 lanes	Illustrative
13	Johnson City	Bristol Hwy (SR 34)	Washington/Sullivan Co. Line	US 19E	4.5	Principal Arterial	Widening	Widen existing 4 lane roadway to 6/7 lanes	Illustrative
17	Johnson City	Knob Creek Rd	Mizpath Hills Dr	Boones Creek Rd (SR 354)	2	Proposed Collector	Widening	Widen existing 2 lane roadway to 4 lanes	2025
19	Johnson City	Watauga Rd (SR 400)	Broadway St	E Fairview Ave	1.1	Minor Arterial	Reconstruction	Reconstruct existing 2 lane roadway to 3 lanes (adding a center turn lane)	2045
20	Johnson City	Watauga Rd (SR 400)	E Fairview Ave	Piney Flats Rd	2.8	Minor Arterial	Reconstruction	Reconstruct existing 2 lane roadway to 3 lanes (adding a center turn lane)	Illustrative
23	Johnson City	Hopper Rd	W Market St (US 11E)	Indian Ridge Rd	0.7	Proposed Collector	Reconstruction	Reconstruct 2 lane roadway addressing geometric issues to align with Hopper Rd Ext	2045
24	Johnson City	Hopper Rd Ext	Indian Ridge Rd	Claude Simmons Rd	1	Proposed Collector	New Road	Construct new 2 lane roadway	2045
29	Washington Co	SR 353	SR 81	SR 107	13.3	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	2045
33	Washington Co	Highland Church	SR 75	Boones Creek Rd (SR 354)	5.3	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	2025

TRANSIT IMPROVEMENTS

For the purposes of the EJ analysis minority population assessment, the MTPO reviewed areas that are currently served by the Johnson City Transit Service's (JCT) fixed-route bus service. The routes are shown in Figure 2. JCT provides service in an area comprised of 50 Census Block Groups. According to the 2009-2013 5-Year ACS estimates, approximately 66,294 people reside in the service area, representing 41% of the total MTPO population (161,359 people) (see Table 5). In that service area, 12% of the residents are minority people; the minority residents in this area represent 69% of the region's total minority population (11,131 people). By comparison, the percentage of non-minority people in the 50 Block Group service area represents 39% of the region's total non-minority population (150,228 people).

Table 5: Characteristics of Census Block Groups with Existing Transit Service

Within	Number of Block Groups	Number People	Percent of Total Census Block Group Population	Total MPTO population	Percent of MTPO Population
Non-Minority	50	58,561	88%	150,228	39%
Minority		7,733	12%	11,131	69%
All		66,294	100%	161,359	41%

Source: ACS 5-Year Estimate, US Census, 2014

The next step was to look specifically at those Census Block Groups in which the share of minority population was equal to or greater than the MTPO region's percentage of minority population (7%) and that are served by the JCT system. A total of 32 Block Groups have minority populations of at least 7% and are served by the JCT system (See Table 6 and Figure 2). Approximately 62% of the region's total minority population resides in those 32 Block Groups.

Table 6: Minority Census Block Groups with Existing Transit Service

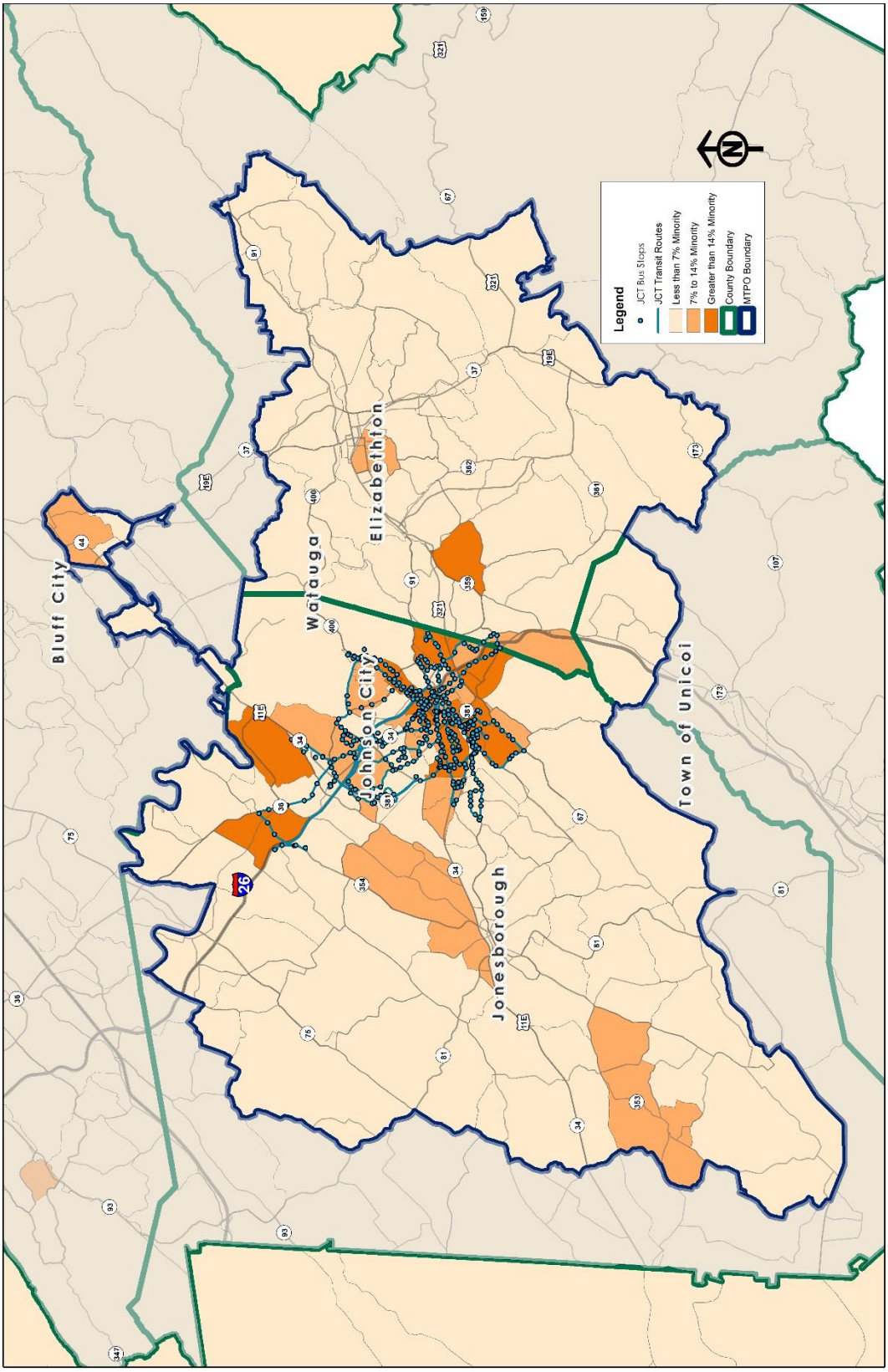
Within	Number of Block Groups	Number Minority People	Percent of MTPO Minority Population
Minority – At Least Regional Average (7% to 14%)	15	1,904	17%
Minority – Double Average (14% or Greater) – **"Communities of Concern"**	17	4,954	45%

Source: ACS 5-Year Estimate, US Census, 2014

As discussed in the previous section "communities of concern" consist of those Block Groups where the minority population is double that of the MTPO area (at least 14% minority). For the existing transit service affected area, 17 Census Block Groups have double the MTPO average share of minority people; these 17 Block Groups represent about 45% of the MTPO region's total minority population. These Block Groups are located primarily in and around downtown Johnson City.

The 2045 MTP contains a list of projects to enhance the existing transit services. Planned public transportation improvements over the 25-year plan horizon are geared toward system expansion including more routes, extended service hours, more bus shelters, and following a normal vehicle replacement schedule. The transit projects are expected to enhance the service for the entire 50 Census Block Group area.

Figure 2
Existing System Transit Improvements in Minority Population Areas



Low-Income Population

According to the 2009-2013 ACS data, approximately 20% of the households located within the MTPO region reported incomes below the federal poverty level (referred to as "low-income" in this analysis). As shown in Table 7, the region's low-income population is in line with the four counties comprising the region, but slightly higher than the state average.

Table 7: Johnson City MTPO Area Low-Income Population

	Total Households	Low-Income Households	Percent Low-Income
Johnson City MTPO	67,350	13,275	20%
Carter County*	24,079	5,373	22%
Sullivan County*	66,239	11,884	18%
Washington County*	51,771	9,316	18%
Unicoi County*	7,601	1,555	20%
Tennessee	2,475,195	410,169	17%

Source: ACS 5-Year Estimate, US Census, 2014
*Numbers represent only Census Block groups located within MTPO area

In the following sections, the effects of the 2045 MTP's highway improvements and the transit system on low-income populations are discussed by type of improvement.

HIGHWAY IMRPOVEMENTS

As mentioned previously, 59 Census Block Groups would be directly affected by the 2045 MTP roadway transportation improvement projects, shown on Figure 3. Within those Census Block Groups, there are a total of 40,310 households, of which 17% (6,829 households) are reported to be low-income (see Table 8).

Table 8: Census Block Groups with Highway Improvements

Within	Number of Block Groups	Number Households	Percent of Total Census Block Group Households	Total MTPO Households	Total MTPO Households (%)
Not Low-Income	59	33,481	83%	54,075	62%
Low-Income		6,829	17%	13,275	51%
All		40,310	100%	67,350	60%

Source: ACS 5-Year Estimate, US Census, 2014

The next step was to look at the Census Block Groups within the affected area (the 59 Block Group area) in which the share of low-income households is higher than the MTPO region's percentage of low-income households (20%). Of the 59 Block Group affected area, 21 Block Groups have a 20% or higher low-income households (See Table 9 and Figure 3).

Six Census Block Groups contain concentrations of low-income households that are at least double the regional average, or at least 40%. These Census Block Groups, identified as "communities of concern" are primarily located in downtown Johnson City and contain approximately 9% of the total low-income households (13,275 households) in the entire MTPO area.

Table 9: Low-Income Census Block Groups with Highway Improvements

Within	Number of Block Groups	Number Low-Income Households	Percent of MTPO Low-Income Households %
Low-Income – (20% - 40%)	15	2,332	18%
Low-Income – Double (40% and Greater) – **"Communities of Concern"**	6	1,242	9%

Source: ACS 5-Year Estimate, US Census, 2014

To determine both the positive and negative impacts on the low-income population in the affected area the highway projects were evaluated. Twelve highway projects fall in Census Block Group areas with over 20% low-income households consisting of new roadways and roadway widenings; roadway reconstructions and realignments; bridge replacements and rehabilitations; interchange ramp improvements; signal and intersection improvements; and safety-related projects. Positive effects by the signal and intersection improvement projects expected to be seen include improved traffic flow in the area. In addition, the safety improvements should have positive effects on the population. The 12 new roadway projects which may have a negative impact on the population are listed in Table 10.

Figure 3
Highway Improvements in Low-Income Population Areas (Below Poverty)

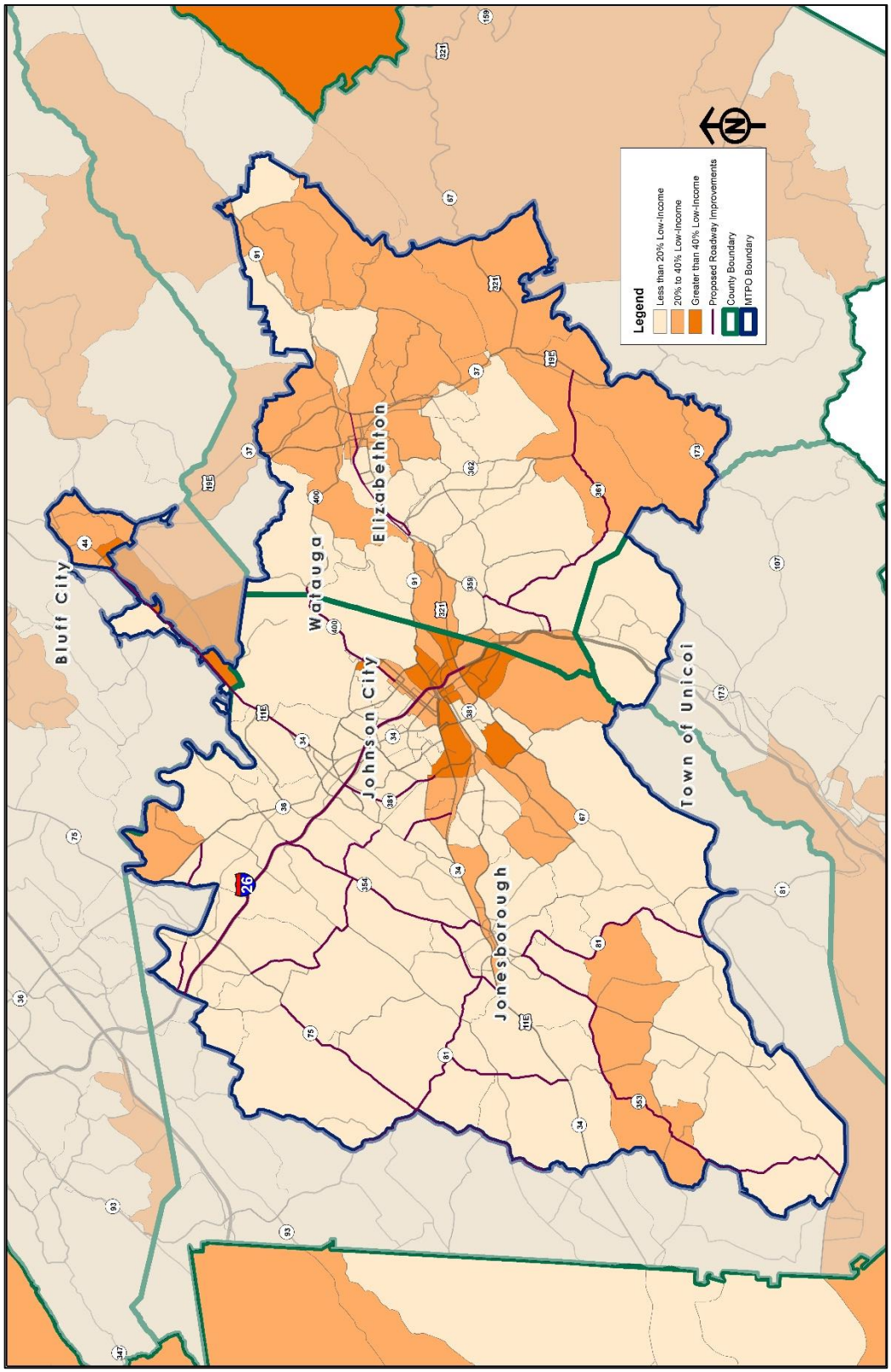


Table 10: Highway Improvements within Block Groups containing Greater than 17% Low-Income Households

2045 MTP #	Jurisdiction	Roadway	From	To	Length Miles	Federal Functional Class	Type of Improvement	Project Description	Horizon Year
4	Johnson City	I-26	N Roan St (US11E)	US 321	3.7	Interstate	Widening	Widen existing 4 lane interstate to 6 lanes	Illustrative
7	Jonesborough	Boones Creek Rd (SR 354)	Jonesborough Bypass	US 11E	1.2	Minor Arterial	Widening	Widen existing 2 lane roadway to 4 lanes	2045
10	Johnson City	N. State of Franklin (SR 381)	Knob Creek Rd	Indian Ridge Rd	1.9	Principal Arterial	Widening	Widen existing 4 lane roadway to 6 lanes	Illustrative
11	Elizabethton	Elk Ave/Broad St (SR 67)	Hudson Dr	Lynn Ave (SR 400)	1.4	Principal Arterial	Widening	Widen existing 4/5 lane roadway to 6 lanes	Illustrative
13	Johnson City	Bristol Hwy (SR 34)	Washington/Sullivan Co. Line	US 19E	4.5	Principal Arterial	Widening	Widen existing 4 lane roadway to 6/7 lanes	Illustrative
19	Johnson City	Watauga Rd (SR 400)	Broadway St	E Fairview Ave	1.1	Minor Arterial	Reconstruction	Reconstruct existing 2 lane roadway to 3 lanes (adding a center turn lane)	2045
20	Johnson City	Watauga Rd (SR 400)	E Fairview Ave	Piney Flats Rd	2.8	Minor Arterial	Reconstruction	Reconstruct existing 2 lane roadway to 3 lanes (adding a center turn lane)	Illustrative
23	Johnson City	Hopper Rd	W Market St (US 11E)	Indian Ridge Rd	0.7	Proposed Collector	Reconstruction	Reconstruct 2 lane roadway addressing geometric issues to align with Hopper Rd Ext	2045
24	Johnson City	Hopper Rd Ext	Indian Ridge Rd	Claude Simmons Rd	1	Proposed Collector	New Road	Construct new 2 lane roadway	2045
29	Washington Co	SR 353	SR 81	SR 107	13.3	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	2045
30	Washington Co	SR 81	SR 353	MTPO Planning Boundary (i.e. to I-26)	13.8	Minor Arterial	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	2045
31	Carter Co	SR 361	SR 359	US 19E	8.9	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	2025

TRANSIT IMPROVEMENTS

As mentioned previously, JCT's current fixed-route bus service is provided to 50 Census Block Groups. In that service area, approximately 66,294 people reside in approximately 28,352 households (see Table 11). Also in that service area, 23% of the households are considered low-income. For comparison, the percentage of low-income households in the transit service area represents about 49% of the region's total low-income population (13,275) and about 40% of the regions non-low income households (54,075). The existing fixed-route transit service is focused in the Downtown Johnson City area serving about 49% of the low-income population.

Table 11: Characteristics of Census Block Groups with Existing Transit Service

Within	Number of Census Blocks	Number of Households	Percent of Total Census Block Group Households	Total MTPO Households	Percent of MTPO Households
Non-Low Income	50	21,849	77%	54,075	40%
Low-Income		6,503	23%	13,275	49%
All		28,352	100%	67,350	42%

Source: ACS 5-Year Estimate, US Census, 2014

The next step was to look specifically at those Census Block Groups in the existing transit service area in which the share of low-income population is equal to or greater than the region's percentage of low-income population (20%). Twenty-three of the Census Block Groups served by transit have low-income populations of at least 20% (See Table 12 and Figure 4). These 23 Census Block Groups serve about 36% of the total MTPO low-income population (4,718 households).

Table 12: **Low-Income Census Block Groups with Existing Transit Service**

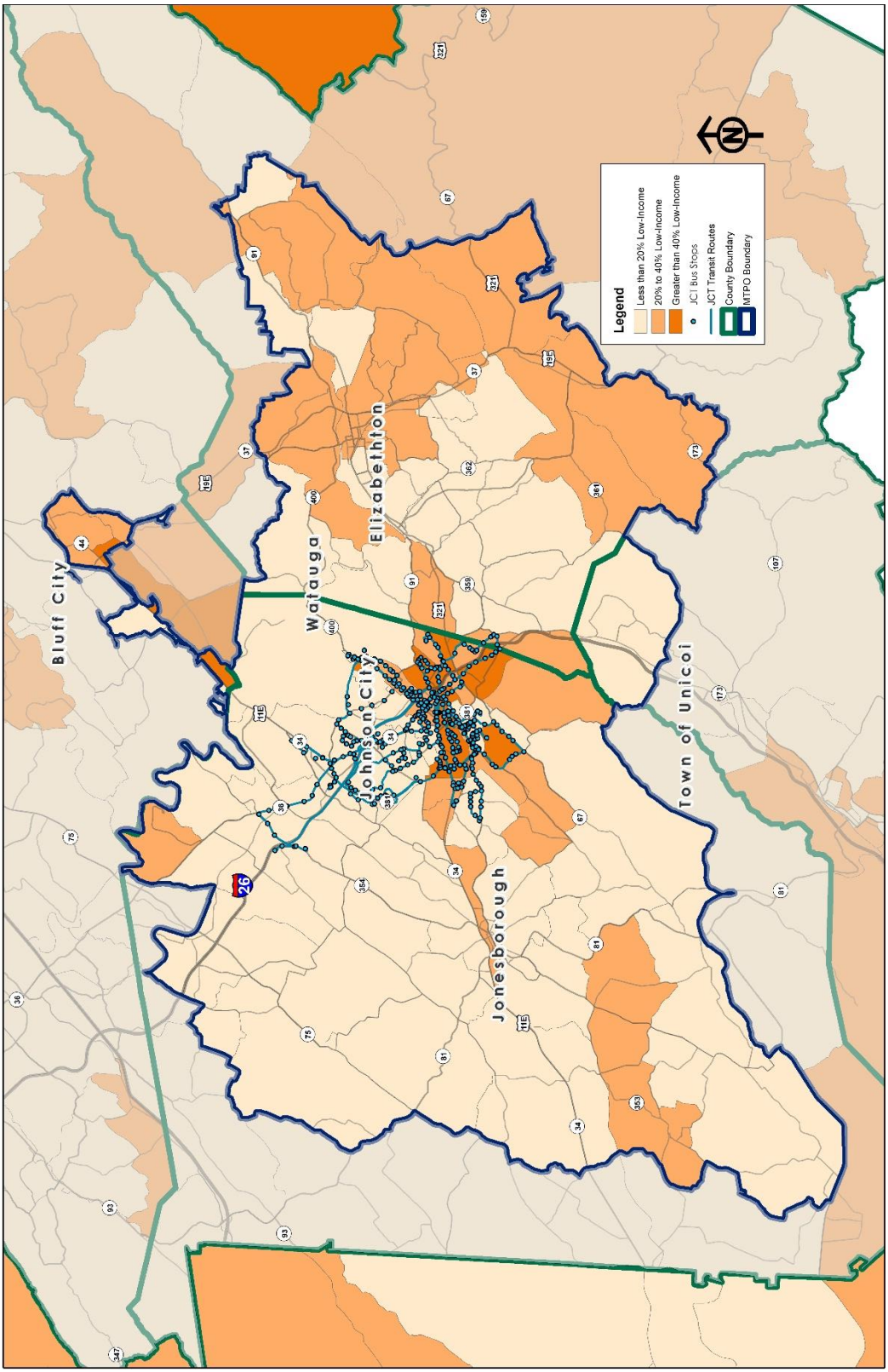
Within	Number of Census Block Groups	Number Low-Income Households	Percent of MTPO Low-Income Households %
Low-Income – (20% - 40%)	13	2,117	16%
Low-Income – Double (Greater than 40%) Communities of Concern	10	2,601	20%

Source: ACS 5-Year Estimate, US Census, 2014

There are 10 Census Block Groups that have low-income populations that meet or exceed 40%; thus, these Census Block Groups which are provided transit service are considered to be "communities of concern" for low-income populations. These Census Block Groups are mostly located in the Johnson City limits.

The 2045 MTP contains a list of projects to enhance the existing transit services. Planned public transportation improvements over the 25-year plan horizon are geared toward system expansion including more routes, extended service hours, more bus shelters, and following a normal vehicle replacement schedule. The transit projects are expected to enhance the service for the entire 50 Census Block Group area.

Figure 4 Existing Transit System Improvements in Low-Income Areas of Concern



Senior Population (Over 65)

According to the 2009-2013 ACS 5-Year estimates, approximately 16% of the population of the MTPO region is 65 years of age or older (referred to as "senior" in this analysis). As shown in Table 13, the region's senior population is lower than that of Sullivan, Carter, and Unicoi Counties.

Table 13: Johnson City MTPO Area Senior Population

	Total Population	Senior Population	Percent Senior Population
Johnson City MTPO	161,359	26,274	16%
Carter County*	57,438	10,328	18%
Sullivan County*	156,741	29,984	19%
Washington County*	123,891	19,293	16%
Unicoi County*	18,254	3,678	20%
Tennessee	6,402,387	887,936	14%

Source: ACS 5-Year Estimate, US Census, 2014

In the following sections, the effects of the 2045 MTP's highway and transit improvements on senior populations are discussed by type of improvement.

HIGHWAY IMPROVEMENTS

As mentioned previously, 59 Census Block Groups will be directly affected by the MTP's proposed highway improvement projects, shown on Figure 5. Within those Census Block Groups, a total of 95,167 people reside, of which 16% (15,538 people) are reported to be in the senior population (see Table 14). The share of the senior population within the affected Census Block Groups (16%) is similar to the overall share of senior population within the MTPO area.

Table 14: Census Block Groups with Highway Improvements

Within	Number of Block Groups	Number People	Percent of Total Census Block Group Population	Total MTPO Population	Percent of Total MTPO Population
Non-Senior Population	59	79,629	84%	135,085	59%
Senior Population		15,538	16%	26,274	59%
All		95,167	100%	161,359	59%

Source: ACS 5-Year Estimate, US Census, 2014

Evaluation of the Census Block Groups within the affected area (the 59 Block Group area) in which the share of senior population is compared to the MTPO region's percentage of senior population was conducted. Of the 59 Block Group affected area, 34 block groups have at least 16% senior population (See Table 15 and Figure 5). Five Census Block Groups contain concentrations of senior populations that are at least double the regional average, (or at least 32%) and therefore are communities of concern. These five Census Block Groups contain approximately 39% of the total senior population (26,274 people) in the entire MTPO area.

Table 15: Senior Census Block Groups with Highway Improvements

Within	Number of Block Groups	Number Senior People	Percent of MTPO Senior Population (%)
Senior Population – (16% - 382%)	29	8,687	33%
Senior Population – Double (32% and up)	5	1,603	6%

Source: ACS 5-Year Estimate, US Census, 2014

Twenty-five highway projects are within Census Block Group areas that have a senior population over 16% consisting of new roadways and roadway widenings; roadway reconstructions and realignments; bridge replacements and rehabilitations; interchange ramp improvements; signal and intersection improvements; and safety-related projects. These 25 projects are listed in Table 16.

Figure 5
Highway Improvements in Senior Population Areas (Over 65)

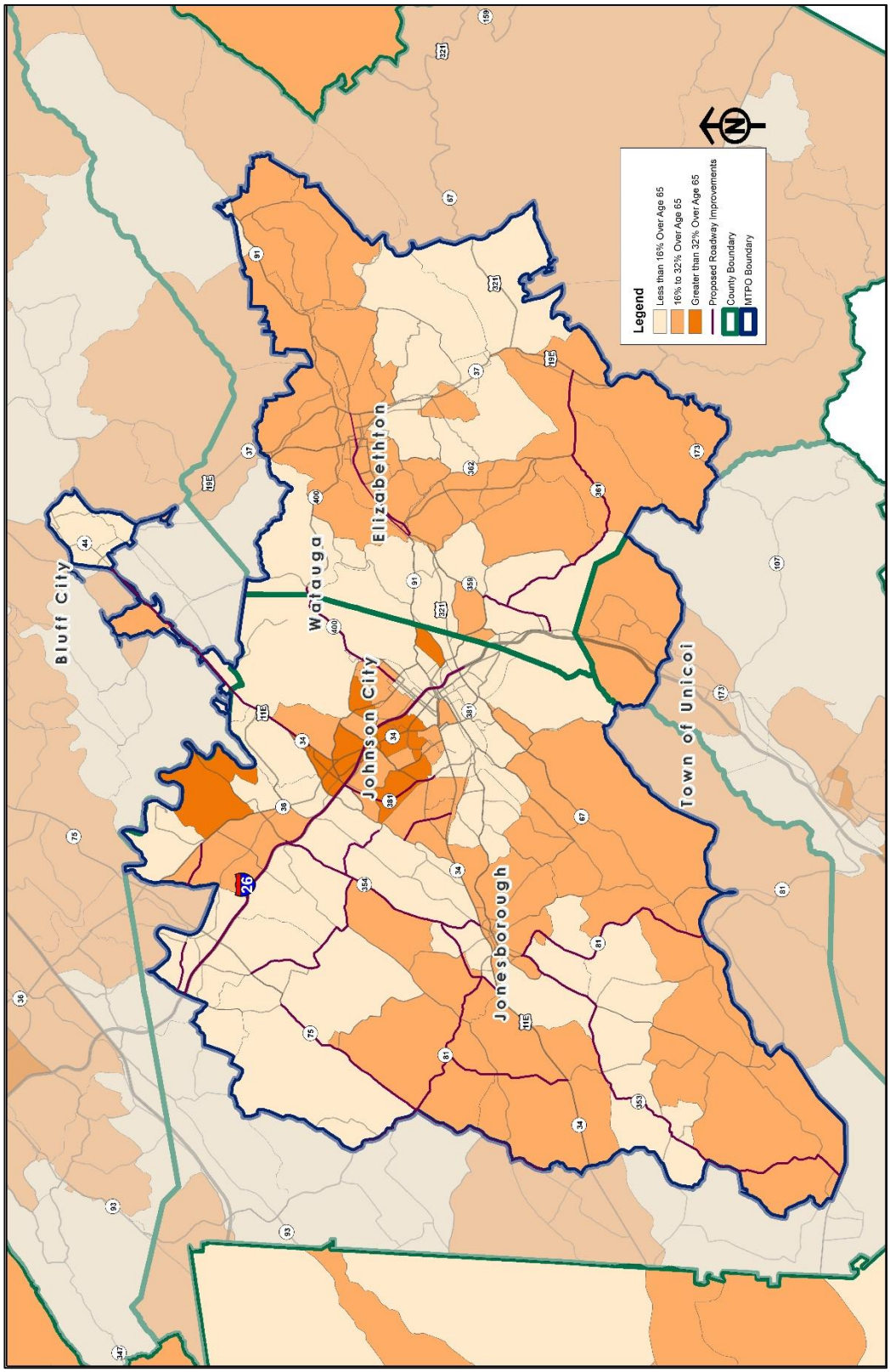


Table 16: Cost Feasible Highway Improvements within Block Groups containing Greater than 16% Senior Population

2045 MTP #	Jurisdiction	Roadway	From	To	Length Miles	Federal Functional Class	Type of Improvement	Project Description	Horizon Year
2	Johnson City	I-26	Bobby Hicks Hwy (SR 75)	Boones Creek Rd (SR 354)	3.7	Interstate	Widening	Widen existing 4 lane interstate to 6 lanes	Illustrative
3	Johnson City	I-26	Boones Creek Rd (SR 354)	N Roan St (US11E)	3.4	Interstate	Widening	Widen existing 4 lane interstate to 6 lanes	Illustrative
4	Johnson City	I-26	N Roan St (US11E)	US 321	3.7	Interstate	Widening	Widen existing 4 lane interstate to 6 lanes	Illustrative
5	Johnson City	Boones Creek Rd (SR 354)	I-26	Highland Church Rd	2.2	Minor Arterial	Widening	Widen existing 2 lane roadway to 4 lanes	2045
6	Washington Co	Boones Creek Rd (SR 354)	Highland Church Rd	Jonesborough Bypass	2.9	Minor Arterial	Widening	Widen existing 2 lane roadway to 4 lanes	2045
7	Jonesborough	Boones Creek Rd (SR 354)	Jonesborough Bypass	US 11E	1.2	Minor Arterial	Widening	Widen existing 2 lane roadway to 4 lanes	2045
8	Jonesborough	Jonesborough Bypass	Boones Creek Rd (SR 354)	US 11E (Persimmon Ridge Road)	2.7	Proposed Minor Arterial	New Road	Construct new 3 lane roadway	2025
9	Johnson City	N. State of Franklin (SR 381)	I-26	Knob Creek Rd	1	Principal Arterial	Widening	Widen existing 4 lane roadway to 6 lanes	2045
10	Johnson City	N. State of Franklin (SR 381)	Knob Creek Rd	Indian Ridge Rd	1.9	Principal Arterial	Widening	Widen existing 4 lane roadway to 6 lanes	Illustrative
11	Elizabethton	Elk Ave/Broad St (SR 67)	Hudson Dr	Lynn Ave (SR 400)	1.4	Principal Arterial	Widening	Widen existing 4/5 lane roadway to 6 lanes	Illustrative
12	Johnson City	Bristol Hwy (SR 34)	N. State of Franklin (SR 381)	Washington/Sullivan Co. Line	3.1	Principal Arterial	Widening	Widen existing 4/5 lane roadway to 6/7 lanes	Illustrative
16	Washington Co	Free Hill Rd	Free Hill Rd	Kingsport Hwy (SR 36)	1.6	Proposed Collector	Reconstruction	Reconstruct 2 lane roadway addressing geometric issues	2045
18	Elizabethton	W G St	W Elk Ave (SR 67)	Hudson Dr	2	Minor Arterial	Reconstruction	Reconstruct existing 2 lane roadway to 3 lanes (adding a center turn lane)	2045
19	Johnson City	Watauga Rd (SR 400)	Broadway St	E Fairview Ave	1.1	Minor Arterial	Reconstruction	Reconstruct existing 2 lane roadway to 3 lanes (adding a center turn lane)	2045
20	Johnson City	Watauga Rd (SR 400)	E Fairview Ave	Piney Flats Rd	2.8	Minor Arterial	Reconstruction	Reconstruct existing 2 lane roadway to 3 lanes (adding a center turn lane)	Illustrative
23	Johnson City	Hopper Rd	W Market St (US 11E)	Indian Ridge Rd	0.7	Proposed Collector	Reconstruction	Reconstruct 2 lane roadway addressing geometric issues to align with Hopper Rd Ext	2045
24	Johnson City	Hopper Rd Ext	Indian Ridge Rd	Claude Simmons Rd	1	Proposed Collector	New Road	Construct new 2 lane roadway	2045
26	Washington Co	SR 75	Boonesboro Rd	MTPO Planning Boundary (i.e. to US 11E)	12.8	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	2045
27	Washington Co	SR 81	Jonesborough Bypass	MTPO Planning Boundary (i.e. to I-81)	14.4	Minor Arterial	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	2045
28	Washington Co	Leesburg Rd	US 11E	SR 81	3.9	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	2045
29	Washington Co	SR 353	SR 81	SR 107	13.3	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	2045
30	Washington Co	SR 81	SR 353	MTPO Planning Boundary (i.e. to I-26)	13.8	Minor Arterial	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	2045
31	Carter Co	SR 361	SR 359	US 19E	8.9	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	2025
32	Carter Co	Okolona Rd (SR 359)	Milligan Hwy (SR 359)	S Roan St	1.6	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	2025
33	Washington Co	Highland Church	SR 75	Boones Creek Rd (SR 354)	5.3	Collector	Safety/Geometric	Safety/geometric improvements (including paved shoulder improvements at select locations/intersections as determined thru the project development process)	2025

TRANSIT IMPROVEMENTS

As mentioned previously, JCT's current fixed-route bus service provides service in an area that comprises 50 Census Block Groups. In that service area, approximately 66,294 people reside (see Table 17) of which 15% of the residents fall into the senior population. The existing fixed-route transit service is focused in the Downtown Johnson City area.

Table 17: Characteristics of Census Block Groups with Existing Transit Service

Within	Number of Census Block Groups	Number of People	Percent of Total Census Block Group Population	Total MTPO Population	Percent of Region Total
Non-Senior Population	50	56,122	85%	135,085	42%
Senior Population		10,172	15%	26,274	39%
All		66,294	100%	161,359	41%

Source: ACS 5-Year Estimate, US Census, 2014

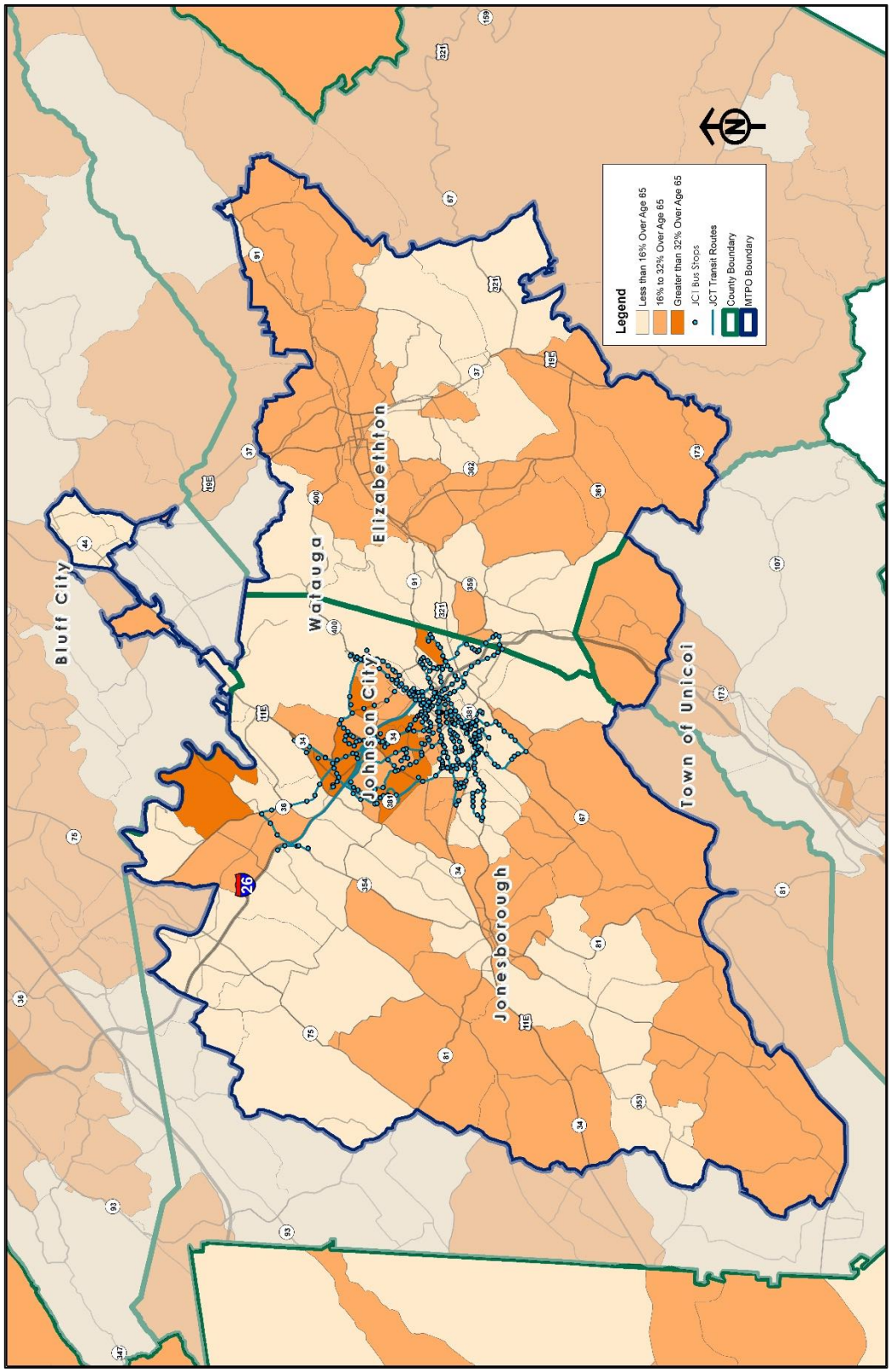
The next step was to look specifically at those Census Block Groups in the existing transit service area in which the share of senior population is equal to or greater than the region's percentage of senior population (16%). Twenty-five Census Block Groups have senior populations of at least 16% (See Table 18 and Figure 6). Of the 25 Census Block Groups identified, 18 have a senior population ranging between 16% and 32%. The remaining seven Census Block Groups have a senior population of 32% or more, which are the only Census Block Groups considered a community of concern for the senior population.

Table 18: Senior Population Census Block Groups with Existing Transit Service

Within	Number of Census Block Groups	Number Senior People	Percent of Total MTPO Senior People
Senior population – (16% - 32%)	18	3,938	15%
Senior population – Double (32%) Communities of Concern	7	2,262	9%

Source: ACS 5-Year Estimate, US Census, 2014

Figure 6
Existing Transit System Improvements in Senior Areas of Concern



Summary of Burdens

Segments of the population that live adjacent to roadway construction projects may endure short-term construction-related impacts related to visual changes, noise, and traffic patterns. Although some of the roadway widening and new construction projects proposed in the 2045 Johnson City MTP will be adjacent to or through areas with minority, low-income, or senior populations, the projects will not disproportionately affect them. Also, some of the projects will include pedestrian and bicycle facilities, which will benefit minority, low-income, and senior populations. The safety and traffic management projects in the area should improve the flow of traffic through the communities of concern.

Lastly, to ensure that all people are considered and involved in the ultimate outcomes of the 2045 MTP (and corresponding transportation improvements), efforts by the MTPO, its member jurisdictions, and TDOT during the project development process should consider special outreach efforts for areas identified as communities of concern to help mitigate any adverse impacts and/or burdens from transportation improvements.

Appendix VI

a. Environmental Mitigation Review

b. Environmental Consultation Process

Environmental Mitigation Review

INTRODUCTION

The FAST Act calls for greater environmental consideration in the development of long range transportation plans. The Johnson City MTPO, as part of the 2045 MTP, has developed an initial understanding of environmental conditions, which can be used to assist in the project development process once a project has moved from the planning stage of this document to the programming stage (e.g. the TIP) for ultimate project implementation.

The Environmental Assessment section includes a discussion of potential environmental impacts and avoidance and mitigation activities at the policy/strategy level based on environmental regulatory framework. The Johnson City MTPO compared projects in the 2045 MTP with available local, state and federal, maps and inventories of historic and natural resources. This discussion assesses the identified environmentally sensitive areas and provides mitigation strategies that could be considered to reduce potential impacts related to transportation improvement projects.

The MTPO will implement the following policies to reflect the region's consideration of environmental factors included in the 2045 MTP Plan:

- An appropriate level of review will occur to assess potential environmental, historic and cultural resource impacts in likely areas for mitigation activities in transportation planning;

- Potential impacts to environmentally sensitive areas will be considered before transportation projects are planned, funded and designed; and

- Consultation will occur with federal, state, tribal and local land use management, natural resources, wildlife, environmental protection, conservation and historic preservation agencies in developing the LRTP.

PROJECT REVIEW

Based on available information, the MTPO utilized its Geographic Information System (GIS) to map locations of known wetlands, flood zones, historic sites, and historic districts within the MTPO planning boundary. By identifying sensitive areas in advance, this effort will help to improve avoidance measures and natural resource mitigation activities to provide greater benefits to the environment regionally.

The MTP project list includes a series of transportation improvements projects that have been identified as potentially impacting sensitive areas. These projects' scopes vary and include signalization, major reconstruction, minor reconstruction, bridge replacements and rehabilitations, new corridors and intersection improvements. The maps on the following pages show where improvement projects may impact the environmentally sensitive areas.

It is important to note, that while the physical footprint of a transportation improvement may not intersect with a known resource, it is possible that unrelated activities of that improvement may have an indirect effect on these sensitive areas. It is also important to note that until a project has gone through a full environmental study, the exact location of the transportation project is not known. The MTP identifies transportation improvement locations for general planning purposes only.

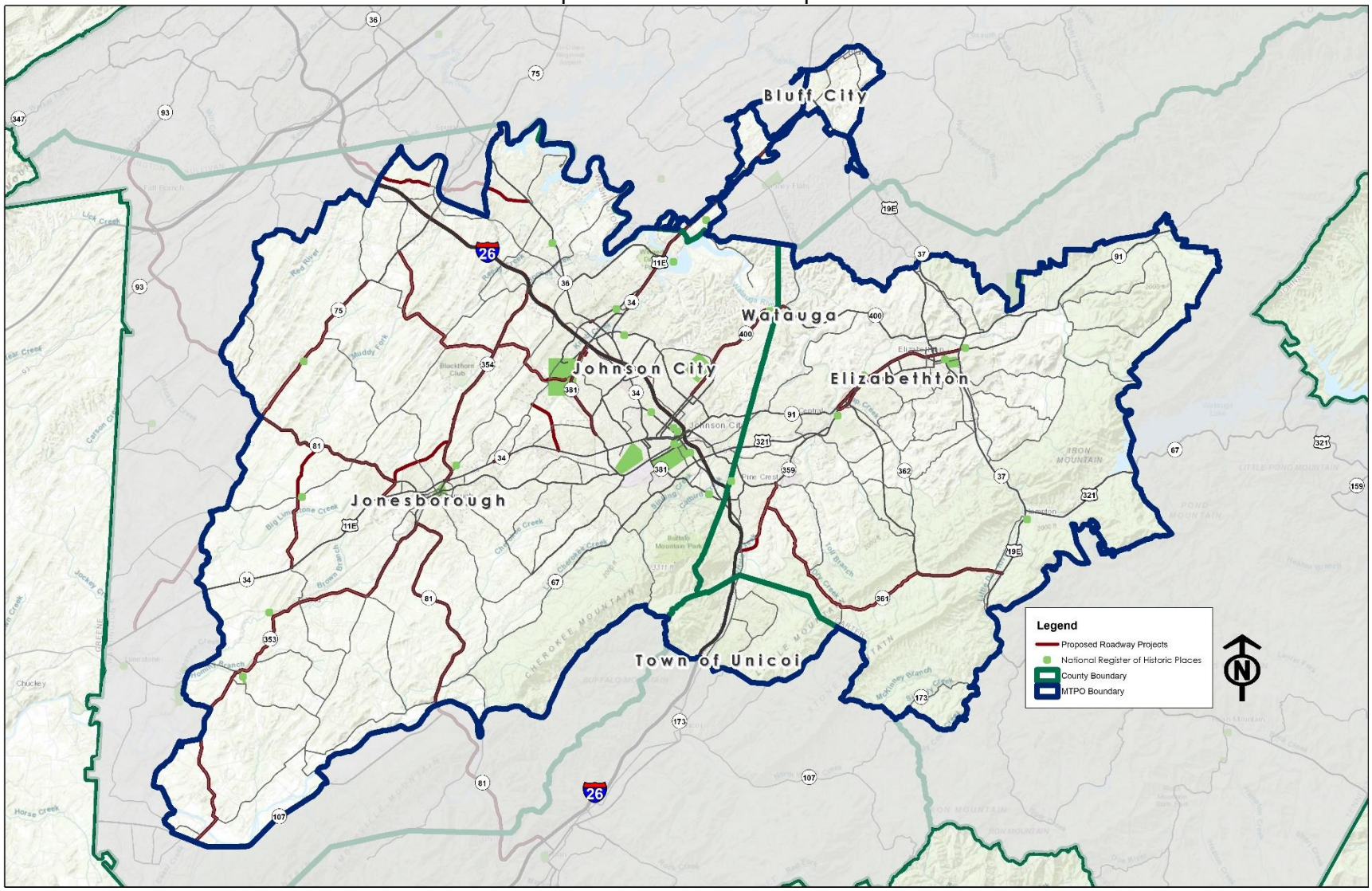
(a) Historic Lands Analysis

Historic site/district avoidance, minimization and mitigation are considered as part of the decision making process for transportation projects. Historic sites and districts have been identified and inventoried within the Johnson City MTPO boundary and are illustrated in the map below. Numerous laws and regulations call for preservation and/or enhancement of cultural resources through various local, state and federal agencies. Federal agencies are responsible for historical review process coordination between state and tribal agencies and officials on various transportation projects. The MTPO coordinates with these various agencies as part of its Long Range Planning process. In order to identify areas where the MTPO's planned projects may impact Johnson City's historic districts, a spatial analysis was undertaken, using the MTPO's geographic information system (GIS).

Figure 1 illustrates the location of historic properties in relation to the planned improvements in the MTP.

From this review, 13 projects from the 2045 MTP were identified for which further study should be done in consultation with the appropriate local, state and federal agencies in the future (i.e. as the project proceeds into the project development process).

Figure 1
Historic Properties & 2045 MTP Improvements



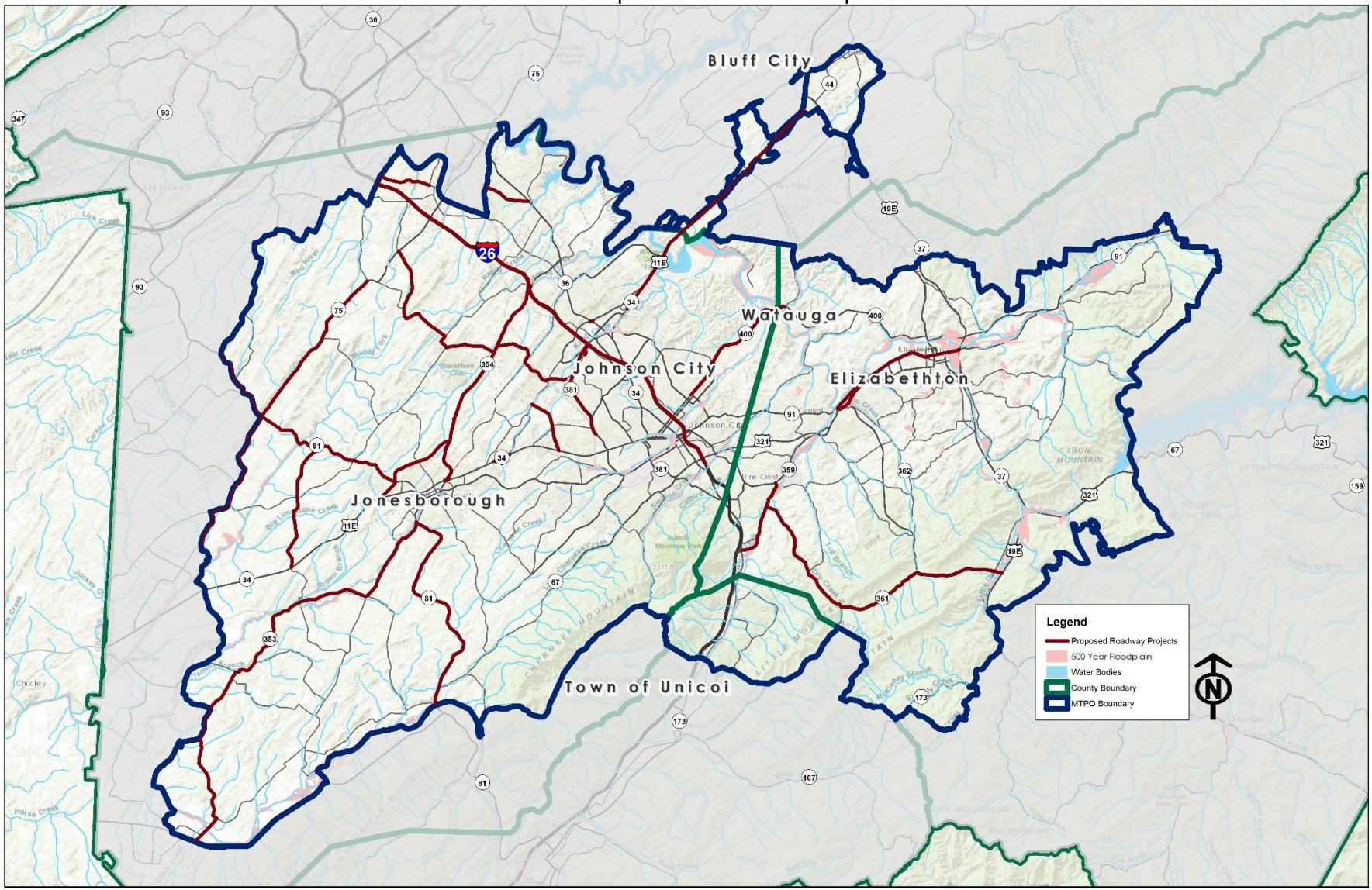
(b) Wetlands and Floodplains Analysis

As transportation projects are developed, it is important to be aware of their potential impacts on the physical environment. Two areas of environmental concern are wetlands and floodplains. Wetlands can be described as lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on the surface. A floodplain is a low plain adjacent to a river that is formed mainly of river sediment and is subject to flooding.

Figure 2 illustrates the location of wetland and floodplain areas in relation to the planned improvements in the MTP.

From this review 31 projects were identified from the 2045 MTP for which further study should be done in consultation with the appropriate local, state and federal agencies in the future (i.e. as the project proceeds into the project development process).

Figure 2
Wetlands and Floodplains & 2045 MTP Improvements



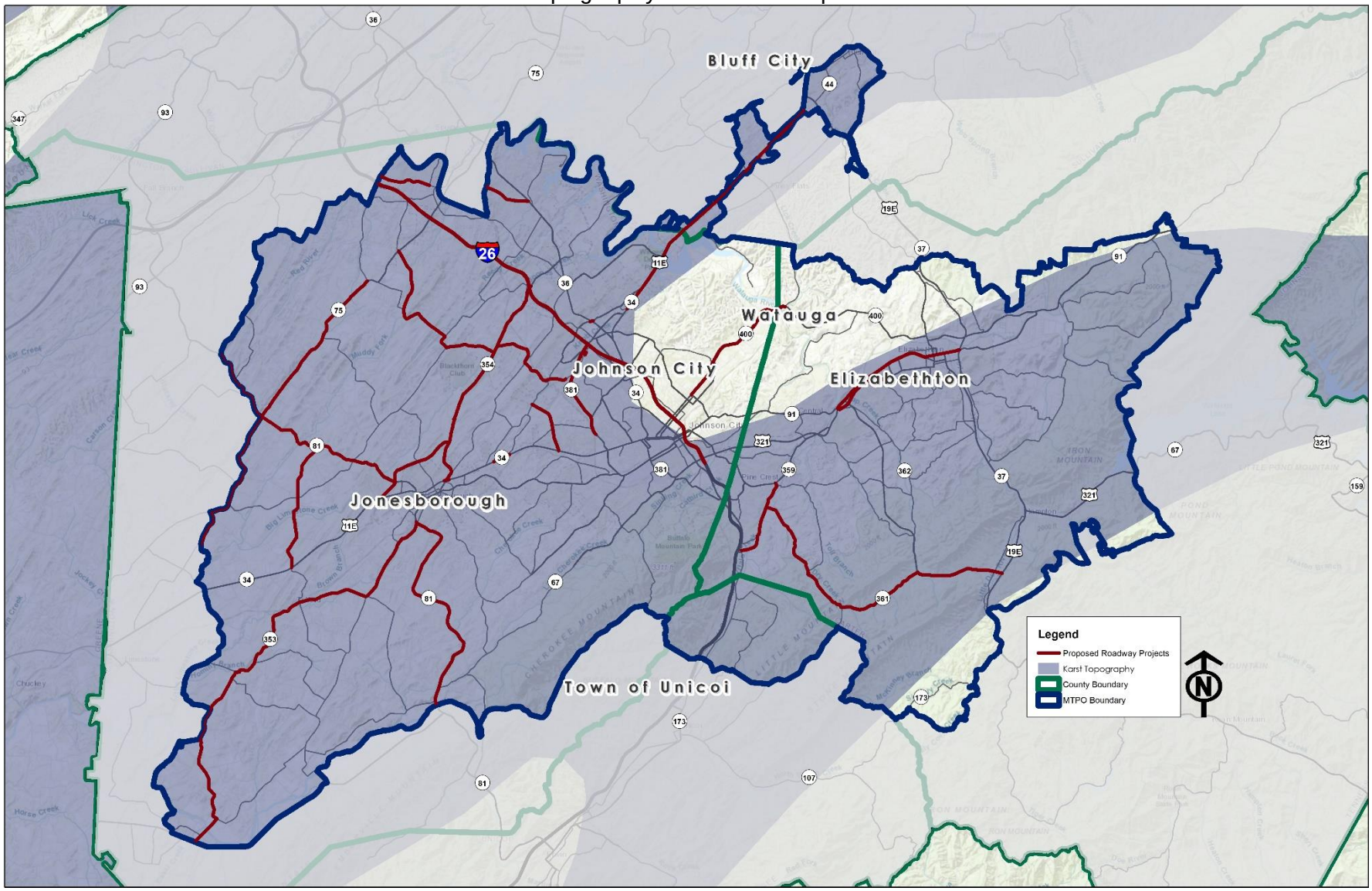
(c) Topography and Karst Analysis

The East Tennessee landscape consists of varied topography that reflects the lithology and geologic structure of the area. Karst makes up a large part of the East Tennessee landscape and is very problematic in locating, designing, and constructing highways. Karst topography is the name give to an area underlain by rocks such as limestone and is characterized by caves, sinkholes, and depressions. The karst system identified in the map below represents possible areas were fissures, tubes, and caves over 1,000 ft (300 m) long; 50 ft (15 m) to over 250 ft (75 m) vertical extent; in moderately to steeply dipping beds of carbonate rock may exist. Potential karst system problems include sinkholes, caves and caverns, collapse incidents, and groundwater contamination. Innovative and cost-effective remedial concepts for solving karst related geotechnical problems include avoidance, using lined ditches and graded rock pads, and other bridging- and drainage-related concepts. Stringent land use and building codes for karst areas are required to ensure the success of karst-related remedial design concepts proposed for highways.

Figure 3 illustrates the location of karst topography areas in relation to the planned improvements in the MTP.

From this review nearly all projects from the 2045 MTP) were identified for which further study should be done in consultation with the appropriate local, state and federal agencies in the future (i.e. as the project proceeds into the project development process).

Figure 3
Karst Topography & 2045 MTP Improvements



ENVIRONMENTAL MITIGATION STRATEGIES

As previously discussed, the FAST Act continues the SAFETEA-LU intention to enhance the consideration of environmental issues and impacts within the transportation planning process. As such, metropolitan and statewide transportation plans must include a discussion of types of potential environmental mitigation activities as part of their plans. The following strategies will be utilized by the MTPO to address and consider environmental impacts relative to the decisions of the MTPO early in the planning process:

- Embrace the principles of Context Sensitive Solutions (CSS) as a means of developing transportation facilities that fit its physical setting and preserves scenic, aesthetic, historic, and environmental resources, while maintaining safety and mobility.

- Continue to utilize the Region's GIS to identify environmental features (both physical and social) early in the planning process as a means of avoidance and/or to establish early corrective action plans prior to project construction.

- Partner with local, state, and federal resource agencies early in the planning process to identify potential issues relative to projects under consideration in the MTPO's plans and programs to develop appropriate solutions prior to actually beginning the project development process.

- Minimize the construction of transportation investments that would impact wetlands.

- Construct greenways as a means of preserving environmentally sensitive lands from inappropriate development.

Environmental impacts cannot always be avoided. Mitigation is the attempt to offset potential adverse effects of human activity on the environment. Mitigation, as listed below, is one of the last steps in the avoidance and minimization process. The mitigation areas and activities will be consistent with legal and regulatory agencies pertaining to human and natural environments. Steps to take in the project development process include the following in relation to environmental impacts:

- Avoid Impacts - The first strategic step in the environmental process is to avoid negative impacts altogether.
- Minimize impacts – If impacts cannot be avoided, they should be minimized by limiting the degree or magnitude of the proposed activity or project.
- Rectify impacts – Repair, rehabilitate, or restore the impacted resource.
- Reduce or eliminate impacts – Preservation and maintenance operations during the life of the proposed activity or project should seek to reduce or eliminate environmental impacts over time.
- Compensate for impacts – A substitute or replacement resource or environmental function of equivalent or greater value could be implemented.

The MTPO will continue to work with the agencies, as defined in the MTPO's Public Participation Plan and Consultation process as projects proceed in the project development process, as appropriate. The MTPO recognizes that not every project will require the same level of mitigation; different projects may utilize more mitigation while others require very little. All impacts on environmentally sensitive areas will be analyzed on a project by project basis to examine what mitigation strategies are appropriate.

The following mitigation activities will be considered on a project by project basis. For major construction projects, such as new roadways, or for projects that may have a region-wide environmental impact, a context sensitive solution process should be considered in which considerable public participation and alternative design solutions are used to lessen the impact of the project. The table below details mitigation activities that could be considered to deal with the primary areas of concern.

Table 1
Potential Mitigation Activities

Environmental Concern	Potential Mitigation Activities
Water Quality and Hydrology	Avoidance, Minimization, Mitigation; Maintain meanders in streams; minimize concrete channelization of streams; reduce use of riprap on river banks opting instead for natural vegetation; wetland mitigation banking; implementation of green infrastructure; bridge sensitive areas; improve stormwater management; compensation (could include preservation, creation, restoration, in lieu fees, riparian buffers); use of reduced-salt or reduced-sand road treatment mixtures in sensitive areas; use of best practices regarding herbicide use
Threatened and Endangered Species, Natural Areas	Avoidance, Minimization, Mitigation; reduction of habitat fragmentation; habitat banking; Smart Growth Concepts; wildlife fencing; maintenance of vegetation along infrastructure rights-of-way; use of native trees, shrubs, and warm season grasses for stabilization of disturbed areas; maintenance of important wildlife movement corridors, possible provision of wildlife crossings; Memoranda of Agreements for species management
Noise	Avoidance, Minimization, Mitigation; Truck restrictions such as the use of engine brakes; noise barriers; construction schedule considerations; speed control; pavement material considerations; roadway design (Context Sensitive Design)
Air Quality and Climate Change	Minimization, Mitigation, Adaptation; Establishing a low-carbon fuel standard (lcfs); Setting regional targets for per capita GHG Green House Gas (GHG) reductions from passenger vehicles; facility energy code standards; reduce and minimize impacts of exposed soils; minimization of idling, both passenger and commercial vehicles through congestion reduction and on-board technologies for freight transport
Neighborhoods, Communities, Homes & Businesses	Minimization, Mitigation; Context Sensitive Design; transit-oriented development (TOD); Smart Growth concepts; noise abatement; ensuring environmental justice; avoidance, minimization of agricultural lands; construction schedule coordination with farm operators; reimbursements to farm operators for loss of income; traffic calming design considerations
Cultural Resources	Avoidance, Minimization, Mitigation: Design considerations, design exceptions, and variances that avoid or minimize impacts to historic properties should be considered first. If avoidance or minimization isn't possible mitigation measures should be considered in cooperation with the appropriate resource agencies and depend on the type of resource being impacted.
Parks and Recreation Areas	Avoidance, Minimization, Mitigation; design considerations; replacement of impacted facilities
Underground Storage Tanks & Contaminated Sites	Avoidance, Minimization, Mitigation; design exceptions and variances; environmental compliance monitoring

Environmental Consultation Process

The list below includes agencies to be consulted with during the development of the MTP.

Federal Agencies:

- Environmental Protection Agency (EPA)
- National Park Service (NPS)
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- U.S. Forest Service

State Agencies & Local Agencies:

- Tennessee Department of Economic and Community Development
- Tennessee Department of Environmental and Conservation
- Tennessee State Historic Preservation Officer
- Tennessee Wildlife Resource Agency

These agencies were sent notification, both by email and hard copy letter, that the draft MTP was available for their review and comment on December 1, 2017. The letter sent out to these agencies is provided on the next page.

Johnson City MTPO
Metropolitan Transportation Planning Organization

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Johnson City, TN 37604-6213
(423) 434-6272 Fax: (423) 434-6280
Website: http://www.jcmpo.org

"Representing the Town of Bluff City, City of Elizabethton, City of Johnson City, Town of Jonesborough, portion of the Town of Unicoi, and portions of Carter, Sullivan, and Washington Counties"

December 1, 2017

RE: Johnson City MTPO's Draft 2045 Metropolitan Transportation Plan
Request for Review & Comment

Dear Resource Agency:

The Johnson City Metropolitan Transportation Planning Organization (MTPO) is currently in the process of developing its new 2045 Metropolitan Transportation Plan (MTP), which will guide future transportation projects and programs within the Johnson City area.

The draft 2045 Plan includes recommendations for various transportation projects and programs that focus on safety, congestion mitigation, improved access, economic development, and mobility options. The Plan includes a significant amount of background data, forecasts of area development and traffic flow patterns, and anticipated funding that will provide the resources for implementing priority projects. Partners in developing this plan include the cities and towns of Bluff City, Johnson City, Elizabethton, Jonesborough, Unicoi, and Watauga, the counties of Washington, Carter, Unicoi, and Sullivan, the Tennessee Department of Transportation, the Federal Highway Administration, and the Federal Transit Administration.

The draft 2045 Plan is available until January 5, 2018 for your organization's official thirty (30) day review and comment period. The Plan documents are available via two avenues: electronically on the MTPO's website (http://jcmpo.org/mtp.html) and in a DropBox (https://tinyurl.com/JC2045MTP) where it can be downloaded from a single location. Comments can be mailed to the above address, or, if you prefer, they can be sent to the following email address: jcmpo@jcmpo.org.

For more information about the 2045 Plan, or if you have questions regarding the review process, please do not hesitate to contact the MTPO at the phone number or email listed above. We greatly appreciate your involvement and support in helping our region make sound transportation investments today and in the future.

Sincerely,

Glenn Berry
Transportation Planning Coordinator and Executive Secretary to the Executive Board